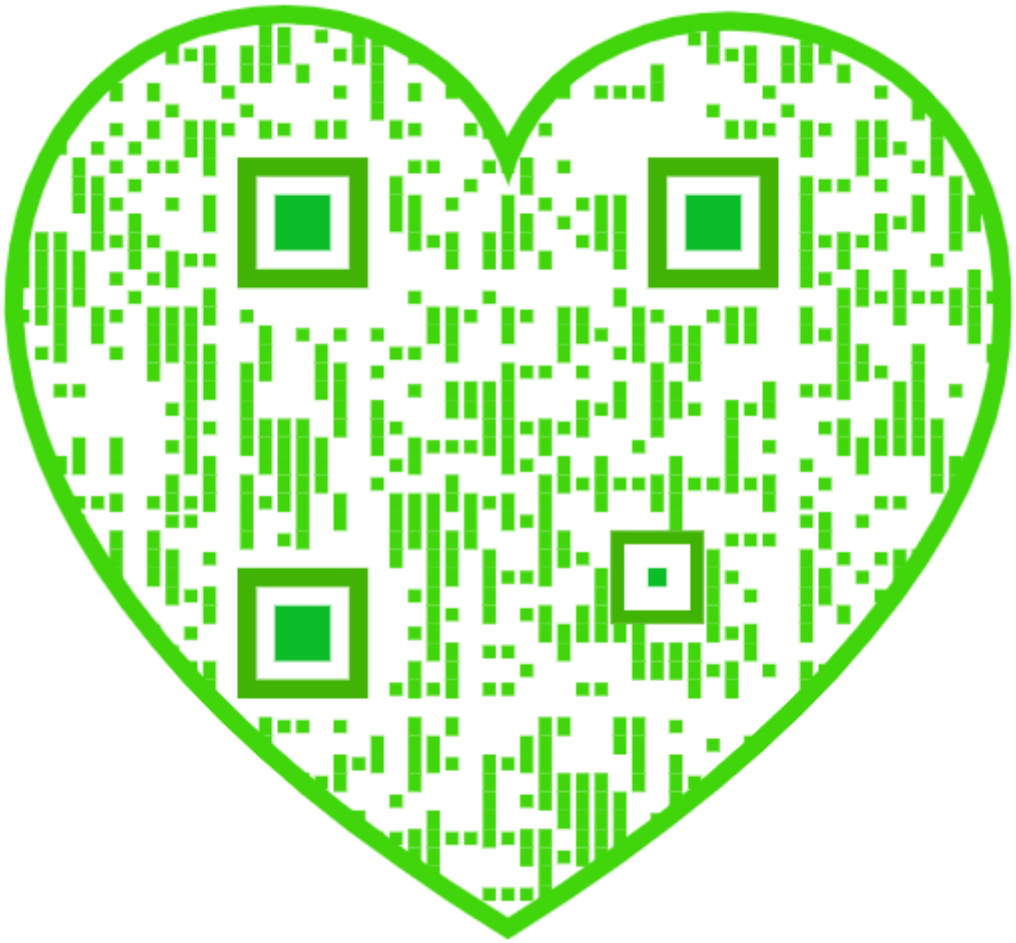
FULL AUTO

H&K 94

FULL AUTO CONVERSION MANUAL



WARNING !

The legal construction and possession of a fully automatic weapon is controlled by the Bureau of Alcohol, Tobacco, and Firearms division of the U.S. Treasury Department.

Proper application to the B.A.T.F., authorization, and permission must be secured before constructing this or any other similar device. Local and state laws vary and may restrict ownership of this or similar type weapons.

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Introduction

The purpose of this manual is to present the necessary engineering data, manufacturing procedures, and machinist drawings for conversion of the semi-automatic HECKLER AND KOCH 94 (HK-94) carbine into a selective-fire weapon, providing both semi-automatic and fully automatic fire at the control of the firer.

In the modified condition as outlined in this manual, the HK-94 will function in basically the same manner as its military counterpart, the HK MP 5. The rate of fire experienced with the HK-94 conversion approximates the same as the MP 5, which is around 800 RPM.

Minor design changes incorporated in the commercial HK-94 have made the exact duplication of the military MP 5 version impractical. However, the information presented in this manual will explain and show these differences, as well as providing the information required for successful conversion.

Heckler & Koch is one of the Free World's most recognized and respected suppliers of military and sporting weapons, and the HK-94 has the distinction of being one of the finest and most accurate semi-automatic "look-alike" guns on the commercial market today. The HK-94

has been engineered along with its military counterparts to be an integral part of a diversified weapon system which incorporates the use of many common parts and interchangeable assemblies among its various models in an effort to reduce world-wide logistical supply problems resultant from such widescale employment.

Along with other notable semi-automatic carbines such as the UZI and STERLING, the HK-94 shares a common evolution in that each of these were originally engineered and produced as selective-fire weapons intended for military and security use. In response to the growing demands of the U.S. shooting community for paramilitary type weapons, each of these weapons were redesigned and introduced into this country as conventional rifles and carbines.

Under Federal guidelines, the MP 5 in all of its variations are restricted regarding importation into the U.S., and can be distributed only to authorized military and police organizations, and also on a limited basis as restricted dealer samples to Class III dealers who supply the above mentioned agencies. Civilian shooters living in states which allow ownership of Title II firearms find themselves in the position that they cannot purchase or own a factory produced MP 5. However, under the same set of Federal guidelines, provisions are made that the individual owning an HK-94 may convert their own weapon into a selective fire MP 5 equivalent by following the ATF Form I registration procedure. Shooters desiring ownership of an "HK-94 conversion" may apply for transfer under procedures of ATF Form 4

(on intrastate transfers) if the weapon is being purchased in the selective-fire condition as performed by a licensed Class II Manufacturer. Individuals wishing to purchase a converted 94 from out of state dealers (interstate transfer) must find a Class III dealer in their state of residence who will have the weapon first transfered to that dealer on ATF Form 3, and then in turn transfer the weapon to the individual on ATF Form 4.

The cost for transfer to an individual at this time stands at the long established rate of $200.00. This is a one time tax which is required to allow ownership of a Title II weapon. Laws concerning the ownership of Title II weapons vary from state to state, and also may be regulated on a county or even city level. Before attempting any modification to the HK-94 or any other weapon for that matter, consult the nearest regional ATF office, the local District Attorney's office, and the local police or county Sherriff's Department for local laws concerning ownership of Title II weapons. One word of caution concerning unregistered conversions is that Federal law provides penalty for illegal conversion up to and including a fine not to exceed $10,000, and incarceration not to exceed 10 years. The ownership of a weapon of this type puts a great responsibility on the part of the owner, and it is imperative that it be done in accordance to all laws and regulations.

The HK-94 A3 selective fire SMG shown with the stock in the retracted position. 800 rpm 9mm provides good accuracy, firepower, and control. *Fig. 1*

The HK-94 A3 is a lightweight modern carbine designed after the HK MP5 SMG. Note stock in the extended position. *Fig. 2*

1

Basic Description

The HK-94 is the commercial version of the MP5 submachine-gun produced by the firm of Heckler & Koch, GMBH, Oberndorf am Neckar, West Germany. The MP5 was developed from the G-3 battle rifle, which uses the same method of operation. The MP5 was adopted in 1966 by the police and border police forces of the Federal Republic of Germany, and remains in use to this date. The MP5 also has been purchased by various military and police organizations worldwide, including several in the U.S..

Variations of the MP5 and 94 currently in production are as follows:

MP5 A2
Fixed stock, 680mm overall length, 225mm barrel length

MP5 A3
Retractable stock, 490mm overall length retracted, 660mm overall length extended, 225mm barrel length

MP5 SD1
Silenced, receiver end cap, no butt stock, 550mm overall length, 146mm barrel length

MP5 SD2
Silenced, fixed stock, 780mm overall length, 146mm barrel length

MP5 SD3
Silenced, retractable stock, 610mm overall length retracted, 780mm overall length extended, 146mm barrel length
MP5K
Vertical foregrip, no buttstock, 325mm overall length
MP5K A1
Same specifications as the MP5K, except there is only a very small front and rear sight provided for undercover deployment.
94 A2
Fixed stock, 890mm overall length, 420mm barrel length
94 A3
Retractable stock, 700mm overall length retracted, 865mm over all length extended, 420mm barrel length

NOTE: All of the MP5 series SMG's can be fit with burst limit selectors which limit the number of shots fired with each pull of the trigger to 3, 4, or 5 shots. This is produced by using a ratcheting device which eliminates conventional full-auto fire.

All variations of the MP5 and 94 are recoil-operated, featuring a stationary barrel and delayed roller-lock bolt system of the type used in the HK G3, 7.62mm battle rifle. This bolt system has been successfully used for nearly 30 years and is a result of the earlier bolt system pioneered by Mauserwerke at Oberndorf for the innovative StG-45 assault rifle of WWII origin.

The MP5 submachine-gun and selective fire HK-94 as presented in this manual operate from

a closed bolt. This method of operation is rather uncommon in the construction of SMG's, although it is not unique. Most submachine guns fire from an open bolt, utilizing a fixed firing pin and using a blowback operated mechanism which requires no locking device to secure the bolt into the receiver during detonation. Similar weapons of this type (such as the UZI, STEN, THOMPSON M1A1) depend on a heavy bolt mass to retard and delay the rearward movement of the bolt until chamber pressure drops to a safe level. In the closed bolt HK-94 and MP5, the bolt incorporates a floating firing pin and dual rollers which cam outward into matching recesses in the receiver, locking the bolt and carrier in the "closed" position. The weapon is readied for firing by manually retracting the cocking lever and releasing it, which allows the bolt and bolt carrier to slam forward, the hammer being held rearward by the sear. The forward movement of the bolt strips the top cartridge from the magazine and feeds it into the barrel. The weapon is now ready to fire, and manipulation of the selector determines the mode of fire. By utilizing a closed bolt mechanism in the MP5 and HK-94 the firer experiences less vibration, improved accuracy, faster lock time, and a lighter overall weight as opposed to most SMG's of this caliber. The two principle criticisms of closed bolt SMG's are their increased price due to the complexity of their mechanisms and the possible danger of "cook-offs" during extremely high volume firing. Although virtually non heard of, the high temperature of the barrel chamber can radiate through the live cartridge and presumably detonate the priming compound when a live round is chambered and left in a hot barrel.

The export version 94 produced by Heckler and Koch and imported into this country retains virtually all of the original MP5 parts and/or assemblies, deleting and modifying only those parts which provide full automatic capability. Also, a longer barrel is incorporated in accordance to Federal law. The modifications required to the 94 to produce selective fire functioning are confined to the hammer, bolt carrier, trigger housing, and grip assembly. In addition, a secondary-sear/release-lever assembly must be manufactured to complete the conversion. An engineering change regarding the manner of attaching the entire trigger housing to the receiver prevents the use of standard MP5 select fire "drop-in" components, necessitating the modification of a few of the existing parts and requires the addition of some new parts.

One noticeable difference in the MP5 and 94 is that the magazine release on the MP5 pivots forward to release, whereas the release of the HK-94 must be depressed from right to left. This is an unfortunate change since the original version as found on the MP5 is much better. It is possible to customize the magazine release with a commercially produced unit called the "TAC-LATCH", which provides a somewhat more accessible release lever.

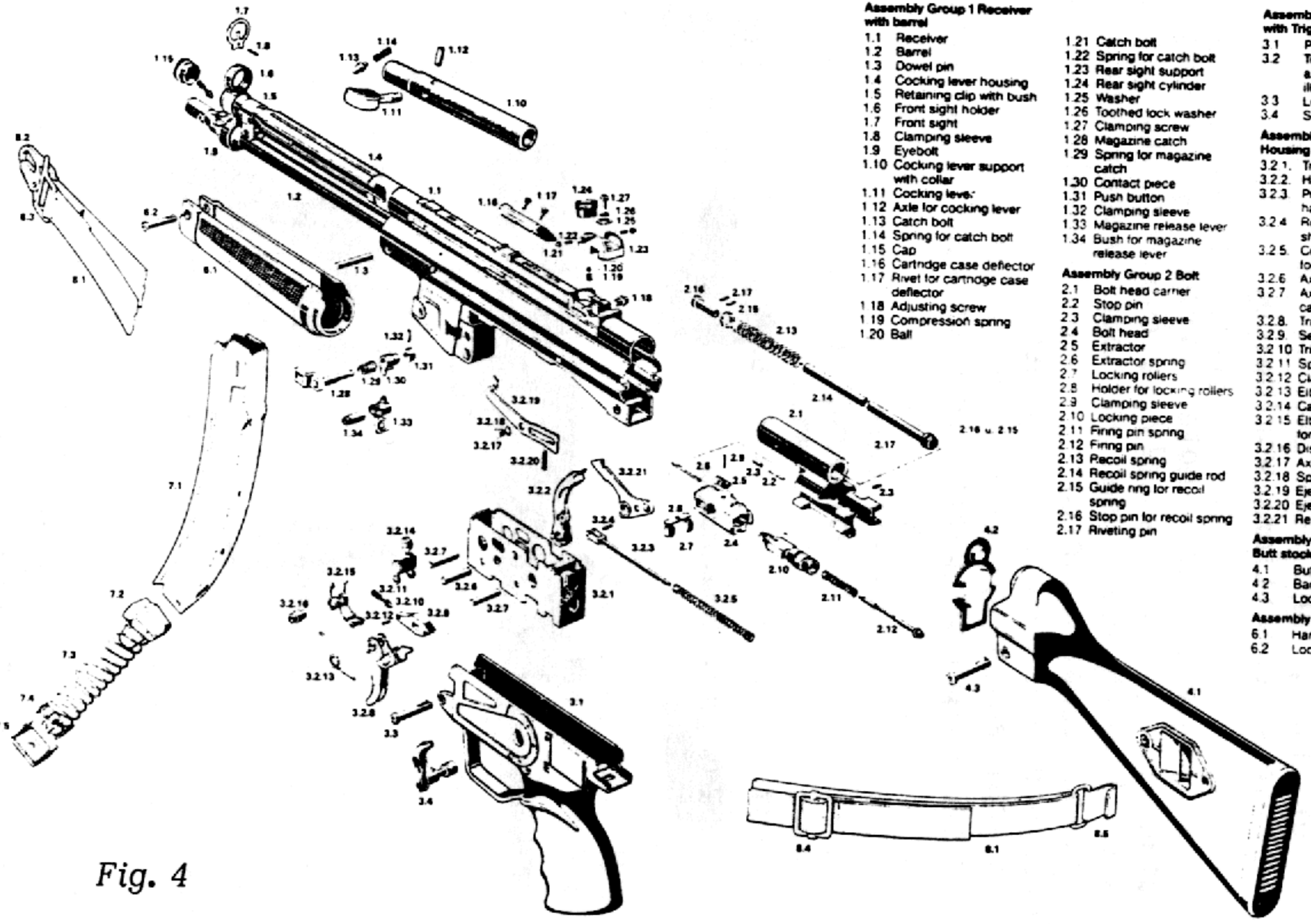
Accessories marketed by H&K and aftermarket suppliers include various telescopic sights and mounts, point firing and laser aiming devices, brass catchers, 15 and 30 round magazines, slings, and image intensifier sights.

These weapons have been proven to be very accurate, owing a great deal to the closed bolt mode of fire, and are rugged and functional under adverse conditions worldwide.

An interesting note from a design, manufacturing, and supply viewpoint is that HECKLER & KOCH has based various weapon systems around a standard trigger group assembly. This alone provides users of these systems with a logistical advantage over other systems requiring different component parts for each type of weapon.

HK-94 A3 shown field stripped into its major components.

Fig. 3



Assembly Group 1 Receiver with barrel
1.1 Receiver
1.2 Barrel
1.3 Dowel pin
1.4 Cocking lever housing
1.5 Retaining clip with bush
1.6 Front sight holder
1.7 Front sight
1.8 Clamping sleeve
1.9 Eyebolt
1.10 Cocking lever support with collar
1.11 Cocking lever
1.12 Axle for cocking lever
1.13 Catch bolt
1.14 Spring for catch bolt
1.15 Cap
1.16 Cartridge case deflector
1.17 Rivet for cartridge case deflector
1.18 Adjusting screw
1.19 Compression spring
1.20 Ball
1.21 Catch bolt
1.22 Spring for catch bolt
1.23 Rear sight support
1.24 Rear sight cylinder
1.25 Washer
1.26 Toothed lock washer
1.27 Clamping screw
1.28 Magazine catch
1.29 Spring for magazine catch
1.30 Contact piece
1.31 Push button
1.32 Clamping sleeve
1.33 Magazine release lever
1.34 Bush for magazine release lever

Assembly Group 2 Bolt
2.1 Bolt head carrier
2.2 Stop pin
2.3 Clamping sleeve
2.4 Bolt head
2.5 Extractor
2.6 Extractor spring
2.7 Locking rollers
2.8 Holder for locking rollers
2.9 Clamping sleeve
2.10 Locking piece
2.11 Firing pin spring
2.12 Firing pin
2.13 Recoil spring
2.14 Recoil spring guide rod
2.15 Guide ring for recoil spring
2.16 Stop pin for recoil spring
2.17 Riveting pin

Assembly Group 3 Pistol Grip with Trigger/Safety Mechanism
3.1 Pistol grip
3.2 Trigger housing, assembled (without illustration)
3.3 Locking pin for pistol grip
3.4 Selector lever

Assembly Group 3.2 Trigger Housing
3.2.1. Trigger housing
3.2.2. Hammer
3.2.3. Pressure shank for hammer
3.2.4 Riveting pin for pressure shank
3.2.5. Compression spring for hammer
3.2.6 Axle for hammer
3.2.7 Axle for trigger and catch
3.2.8. Trigger
3.2.9. Sear
3.2.10 Trigger bolt
3.2.11 Spring for trigger bolt
3.2.12 Clamping sleeve
3.2.13 Elbow spring for trigger
3.2.14 Catch
3.2.15 Elbow spring with roller for catch
3.2.16 Distance sleeve
3.2.17 Axle for ejector
3.2.18 Spring ring
3.2.19 Ejector
3.2.20 Ejector spring
3.2.21 Release lever

Assembly Group 4 Fixed Butt stock
4.1 Butt stock
4.2 Back plate
4.3 Locking pin for butt stock

Assembly Group 6 Handguard
6.1 Handguard
6.2 Locking pin for handguard

Assembly Group 7 Magazine
7.1 Magazine housing
7.2 Follower
7.3 Follower spring
7.4 Spring floor plate
7.5 Magazine floor plate

Assembly Group 8 Multi-purpose carrying sling
8.1 Carrying sling
8.2 Carbine hook
8.3 Double eye
8.4 Buckle
8.5 Spring hook

Fig. 4

9 mm MP5 A2 Heckler and Koch sub-machinegun

2

Physical Differences

This chapter examines and notes the physical differences between the MP5 and HK-94. Although not directly needed as far as the actual conversion is concerned, it is of academic interest from a design viewpoint to be knowledgable of the differences. Each sub-title will discuss the differences of the respective parts.

MAGAZINE LATCH ASSEMBLY

Both the MP5 and 94 utilize a push button magazine release located on the right side of the lower receiver. The MP5 also features a vertical release lever located directly below the push button assembly. The vertical release lever is very desirable, and permits magazine removal with the left hand without ever changing the grip of the firing (right) hand. The lever is manipulated with the thumb of the left hand.

PISTOL GRIP - RECEIVER ASSEMBLY

The MP5 uses a total of two locking pins to secure the assembly of the receiver, grip assembly, and buttstock. The rear locking pin passes through the buttstock housing adapter, receiver, and upper rear portion of the grip. The front of the grip has two ears which has a central hole passing through them. These ears straddle the lower rear portion of the

magazine housing and the second locking pin passes through the alignment holes in both parts. By having the grip attach to the magazine housing in such a manner, the entire grip/trigger group can be swung down when field stripping. The grip of the HK-94 does not have these ears, instead a machined block welded into the lower front of the grip has a lug which engages a machined slot in the magazine housing on the back side. Only one locking pin is used to assemble the HK-94 in both the A2 and A3 versions.

Because of this particular engineering change in the HK-94, an exact duplicate MP5 type conversion using parts from it is impossible, partly because of the machined block welded in the grip changes the location of the drilled hole through which the secondary sear (referred to as catch by HK) and torsion spring and spindle assembly are secured in the trigger housing. This relocation of the hole prevents the use of the factory made catch.

One other change noted in the grip is the addition of the third selector positioning detent in the left side of the assembly. The MP5 fire control positions are identified as "S" or "0" for SAFE, "E" or "1" for SEMI, and "F" or "2" for FULL AUTO firing. The two detents in the HK-94 will be in the same relative position as those of the MP5, the third position for full automatic fire being deleted.

TRIGGER HOUSING

As previously mentioned in the Grip section, the location of the hole retaining the sear torsion spring, spindle, and axle is moved

rearward in the 94 trigger housing, preventing the use of original MP5 parts. A second difference in the 94 trigger housing is the addition of a trigger limit stop pin, which acts to limit the upward movement of the rear portion of the sear, thereby preventing the sear nose from moving low enough not to intercept the hammer.

HAMMER

The MP5 hammer features two machined and ground engagement notches. The lower notch engages the primary sear, while the front notch engages the secondary sear (catch). The hammers being provided in the HK-94 carbines received are found having a factory MP5 hammer with the two notches, or they may be received in which the MP5 hammer has had the front notch removed by grinding. The depth of the notch between a MP5 hammer will be different in relationship to the centerline of the hammer axle hole when compared to the same measurement from a reworked hammer as used in this conversion. For this reason, the conversion described in this manual assumes that the user has a "semi-only" factory reworked hammer, and the secondary sear notch will be ground as shown in the accompanying drawings. If a MP5 hammer is supplied in a HK-94, this conversion will work, although the profile on the secondary sear block and release will be slightly different. If this is the case, make the release lever and secondary sear assembly as drawn, and hand fit the contact area of the lever and block until the assembly disengages from the hammer when dry firing.

CATCH (SECONDARY SEAR)

The MP5 utilizes the use of an auto sear, denoted

in the H&K drawings as a "catch". This is the part which pivots on the catch axle to intercept and hold the hammer in a rearward position during each firing cycle, both in semi-automatic and fully automatic firng. This part is contacted by a separate release lever which pivots independantly from the catch. The catch is deleted from all semi-auto HK-94 carbines.

RELEASE LEVER

The MP5 utilizes a separate release lever which is contacted and pivoted forward by the bolt carrier during each firing cycle. Unlike the release lever used in this conversion which is a part of a rigid assembly consisting of the secondary sear, spindle, and release lever, the release lever in the MP5 is much longer and pivots on the hammer axle. The longer length of the lever in conjunction with the angle of its interception by the bolt carrier provides good leverage and a very smooth movement. The release lever is not present in any of the HK-94 carbines.

BOLT CARRIER

The bolt carrier of the MP5 and the HK-94 both are apparantly produced identical to each other, the only difference being that the camming radius that contacts the top of the release lever is machined out in the HK-94 bolt carrier, so as to prevent its use in conjunction with an auto-sear mechanism. This method of using one particular part as the basis for both weapons is novel also in that at any given time in the various production runs of 94, the MP5 bolt carriers can simply be removed from stock and the minor operation of removing the contact radius be performed at that time.

1. *Grip Assembly*
2. *Trigger Assembly*
3. *Locking Pin*
4. *Plastic Grip*
5. *Panhead Screw*
6. *Lock Washer*
7. *Selector Lever*

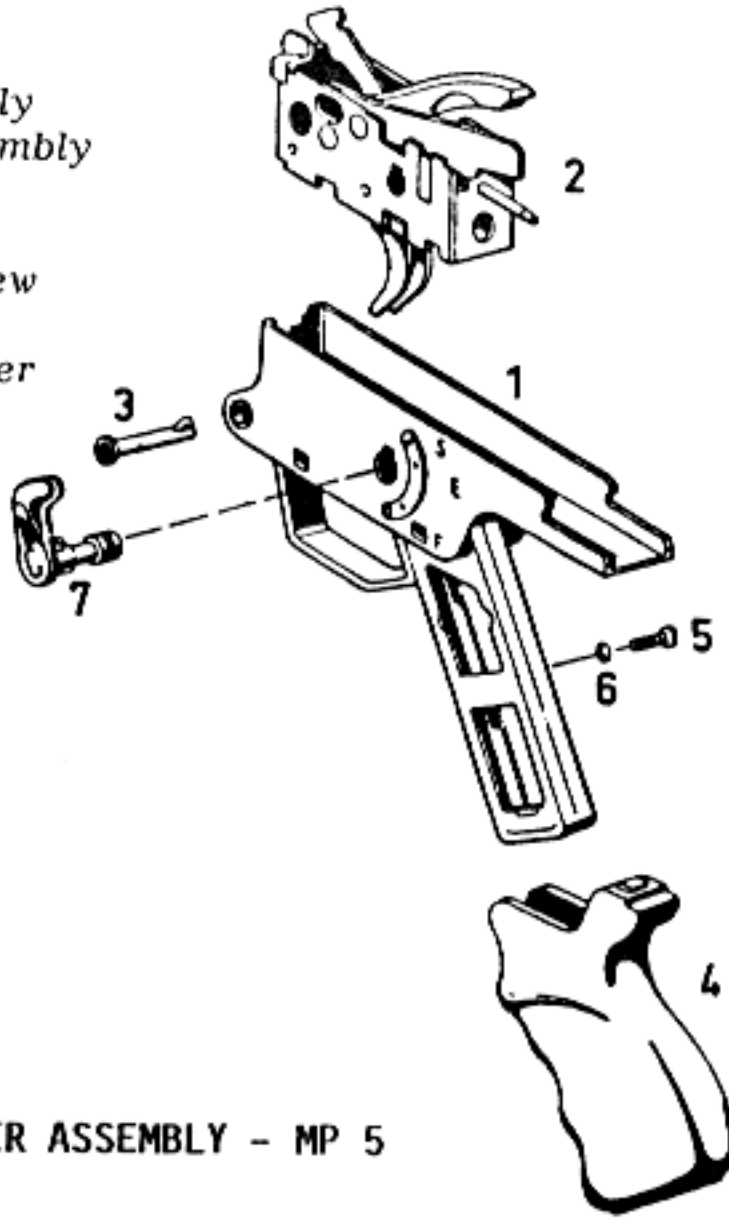
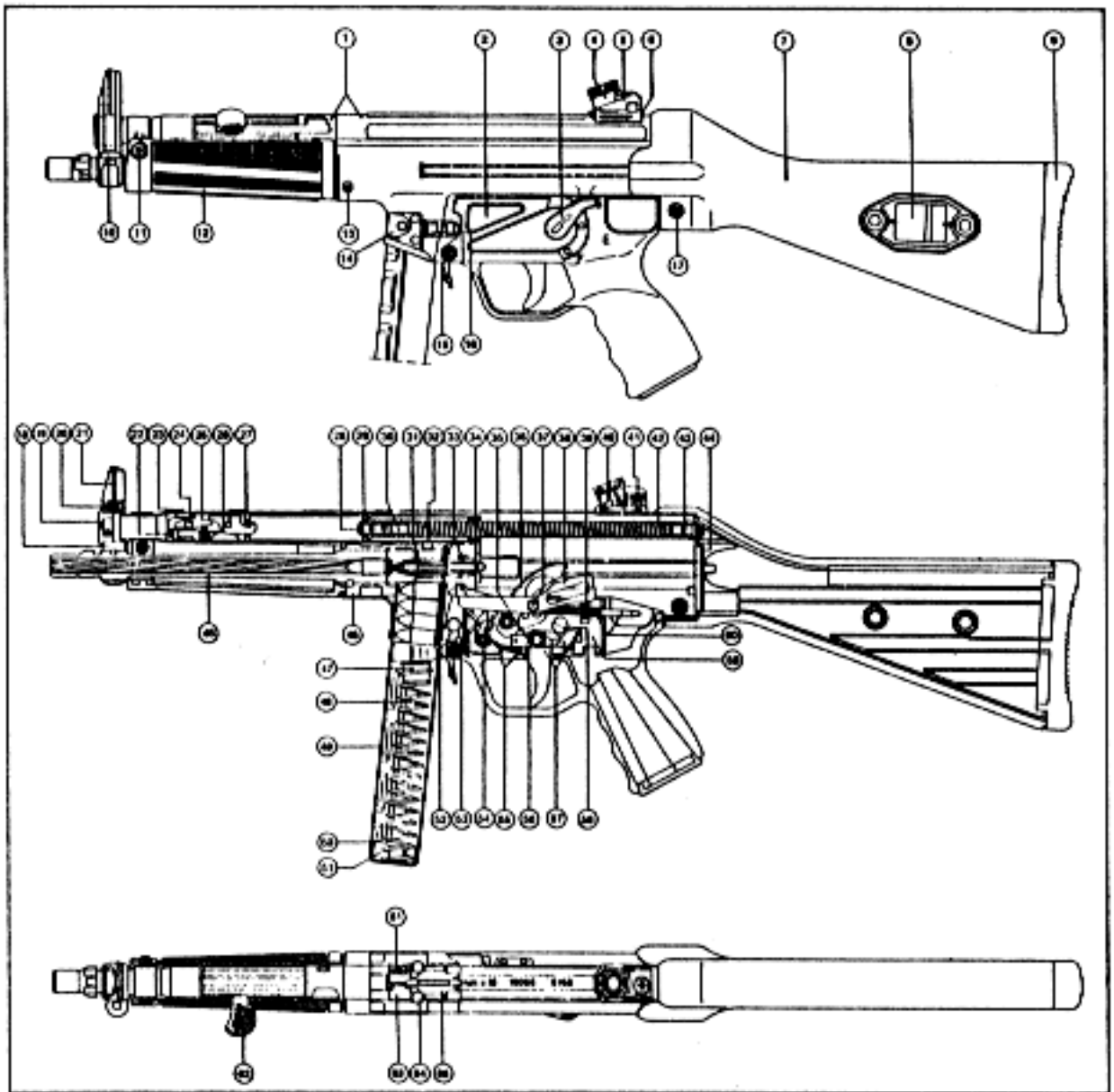


Fig. 5

GRIP AND TRIGGER ASSEMBLY - MP 5

The grip assembly (1) is the housing in which the entire trigger assembly is inserted in assembly. The trigger assembly (2) fits securely into the grip frame, and the selector lever (7) is inserted through the left side of the grip, passing through a corresponding hole in the trigger assembly. The selector lever is positioned by the firer for "SAFE", "SEMI-AUTOMATIC", or "FULL-AUTOMATIC" modes of firing.

The plastic grip (4) is positioned over the grip assembly and is held by means of a panhead screw (5) and lock washer (6). The entire grip assembly is fixed to the receiver by means of a locking pin (3).



1 Receiver with operating lever housing
2 Grip assembly
3 Safety catch
4 Rotary rear sight
5 Sight support
6 Sight base
7 Butt stock
8 Sling holder
9 Butt plate
10 Eyebolt
11 Locking pin for handguard
12 Handguard
13 Cylindrical pin
14 Hook
15 Locking pin for grip assembly
16 Magazine catch
17 Locking pin for butt stock
18 Frontsight holder
19 Cap
20 Clamping sleeve for frontsight
21 Frontsight
22 Catch bolt
23 Stop ring
24 Rivet for catch lever
25 Catch lever
26 Catch spring
27 Axle for operating handle
28 Stop pin for recoil spring
29 Guide ring
30 Recoil spring guide rod
31 Clamping sleeve
32 Bolt body
33 Firing pin with firing pin spring
34 Release lever
35 Elbow spring for trigger
36 Hammer
37 Ejector spindle
38 Ejector
39 Ejector pressure spring
40 Screw socket with rivet
41 Binding screw with locking washer
42 Recoil spring
43 Rivet
44 Bottom plate
45 Barrel
46 Barrel extension
47 Follower
48 Follower spring
49 Magazine tube
50 Magazine floor plate
51 Safety cup with guide bush
52 Magazine catch lever with roller
53 Transmitting piece for magazine catch
54 Catch
55 Elbow spring with roller
56 Sear
57 Trigger
58 Safety pin
59 Trigger housing
60 Pressure shank & pressure spring
61 Extractor with extractor spring
62 Operating handle
63 Bolt head
64 Locking roller
65 Locking piece

Fig. 6

3

Sequence Of Operation

To ready the HK-94 for firing, first insert a loaded magazine into the magazine well until it is firmly seated, being retained at this time by a spring-loaded catch which locks it in place. The firer then retracts the cocking handle found on the left forward side of the receiver fully rearward, then releasing it sharply, which in turn under the influence of the heavy recoil spring causes the bolt and carrier assembly to slam forward, stripping a live cartridge from the top of the magazine and feeding it into the chamber of the barrel. At the time the cocking handle was retracted, the hammer was rotated rearward, and the sear nose and secondary sear both under tension from their respective springs move in position against the hammer in such a manner that upon the forward movement of the bolt and carrier assembly, the hammer is intercepted and held in a "cocked" position by the sear. The secondary sear/release lever assembly (to be hence forth referred to as auto-sear in this chapter) at the time of final forward movement and locking of the bolt and carrier assembly is forced to pivot forward after being contacted by the radiused portion of the tripping block. This movement of the auto-sear is repeated during each cycle of the weapon, regardless of the mode of operation.

With the auto-sear forward at this time, the primary sear is holding the hammer rearward.

Upon the forward movement of the bolt and carrier assembly, the dual locking rollers in the bolt head are in a recessed position until the bolt positively positions against the breech of the barrel, and the continuing forward movement of the locking piece and bolt carrier against the stationary bolt cam the rollers outward into matching recesses in the receiver wall. The weapon at this time is in a ready condition, and the selector would be positioned at the uppermost setting for "safe". In this position, the rear extension of the trigger is prevented from upward movement by a machined notch in the selector shaft. The weapon is to be carried in this mode until ready to fire.

SEMI-AUTOMATIC FIRING

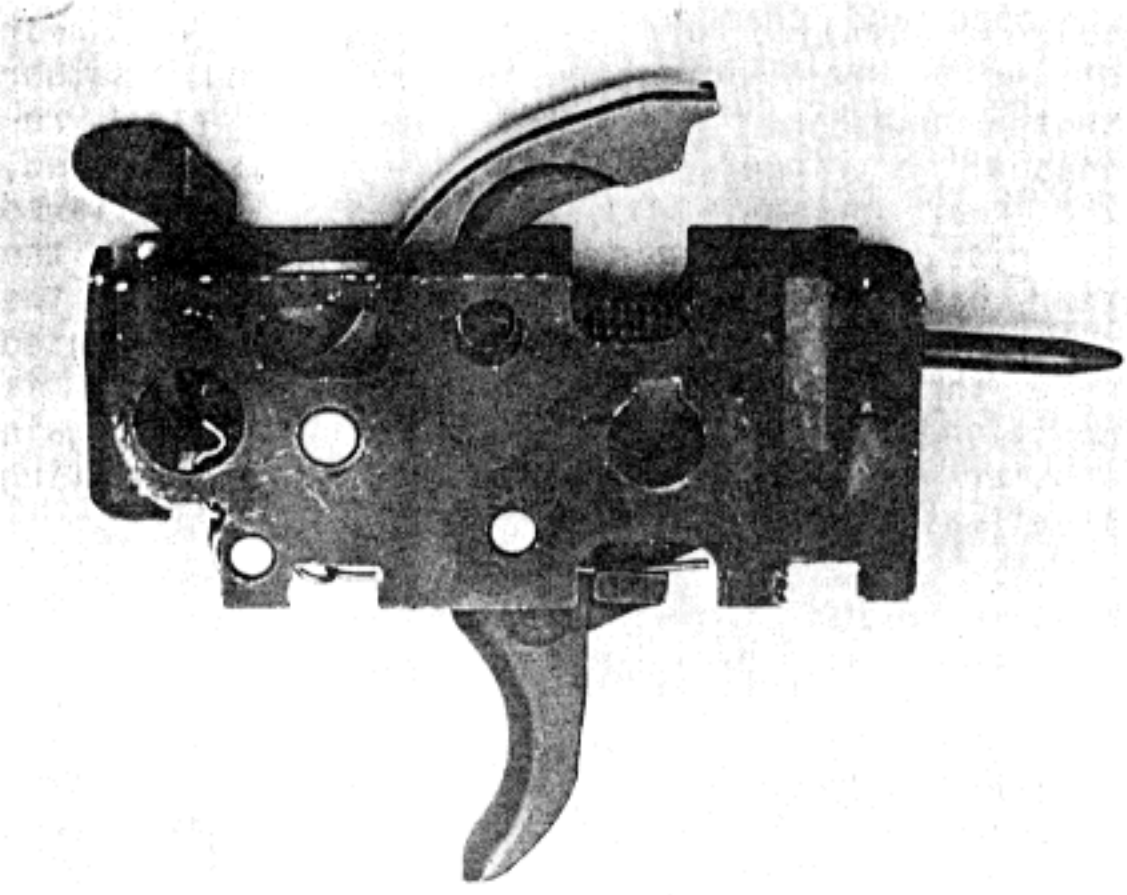
If the firer chooses to fire single shots, the selector is rotated down to the middle detent, identified as "F" or "1". When the trigger is operated by depressing rearward, the sear is rotated down at the front and out of engagement with the notched portion of the hammer. The rear movement of the trigger is stopped at the proper point by a corresponding notch in the selector shaft. When the hammer rotates to fire the round, the spring-loaded sear slips forward under the influence of the trigger bolt spring, and the tail of the sear drops off a fixed step located on the top, rear area of the trigger. This is called the "pull-off surface". With the firer still holding the trigger down, the hammer strikes the firing pin, detona-

ting the primer and cartridge. When the chamber pressure reaches a safe level, the forces against the bolt cause the rollers to move out of their recesses in the receiver, and the residual pressure in the barrel causes the bolt and carrier assembly to move rearward, extracting the empty case at this time. The movement of the bolt carrier rearward in turn forces the hammer to rotate to the rear, the auto-sear and primary sear rising and intercepting the hammer as the bolt and carrier reverse direction under pressure of the recoil spring. Again, a live round is stripped and chambered. Since the tail of the sear was pulled off of the step at the rear of the trigger during the initial firing, another shot cannot be fired until the firer first releases the trigger. When the trigger is released, the rear end or tail of the sear is allowed to rise, the trigger bolt spring forcing the sear backwards up on top of the step of the pull off surface. The sear has an elongated hole through it in which the trigger axle is positioned. When the trigger is depressed again another round will be fired, the cycle repeating itself as described.

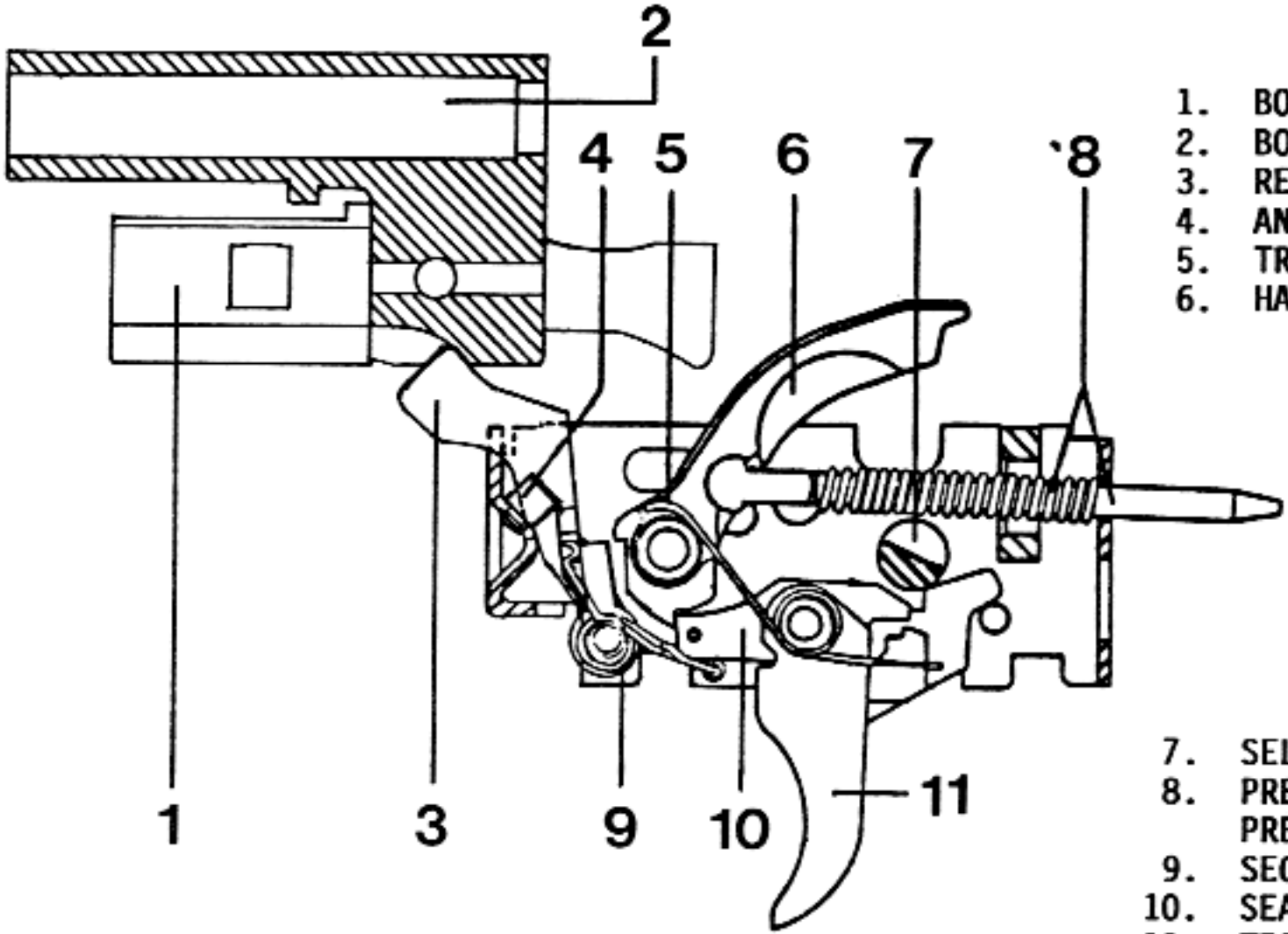
FULL-AUTOMATIC FIRING

When the selector lever is rotated down to the "A" or "2" position, fully automatic fire will result. Depressing the trigger firmly in this position allows the sear tail to rise so high that the front of the sear is positioned low enough so that it does not intercept and hold the hammer after the initial shot. However, the auto-sear catches and holds the hammer after each shot is fired, until a point in which the

tripping block in the bolt carrier contacts and disengages the secondary sear from the ground notch in the front of the hammer. By freeing the hammer from engagement with the auto-sear, the hammer rebounds forward, striking and detonating the cartridge. This sequence will continue until the weapon runs out of cartridges, or until the firer releases the trigger at which time the sear nose rises and catches the hammer. The weapon is at this time cocked and merely pulling the trigger will initiate the firing sequence again.



Left side view of Trigger Housing. Note position of Release Lever. Bolt Carrier slamming shut would move the lever forward releasing Hammer from Secondary Sear. Selector manipulation will produce "SEMI" or "FULL" automatic mode of operation. *Fig. 7*



1. BOLT HEAD
2. BOLT CARRIER
3. RELEASE LEVER
4. ANVIL FOR HAMMER
5. TRIGGER SPRING
6. HAMMER
7. SELECTOR LEVER SHAFT
8. PRESSURE SHANK & PRESSURE SPRING
9. SECONDARY SEAR
10. SEAR
11. TRIGGER

Fig. 8

1. *Bolt head carrier*
2. *Firing pin*
3. *Release lever*
4. *Anvil for hammer*
5. *Trigger spring*
6. *Hammer*
7. *Selector lever shaft*
8. *Pressure shank & pressure spring*
9. *Catch (secondary sear)*
10. *Elbow spring with roller (torsion spring)*
11. *Trigger lever (sear)*
12. *Trigger*

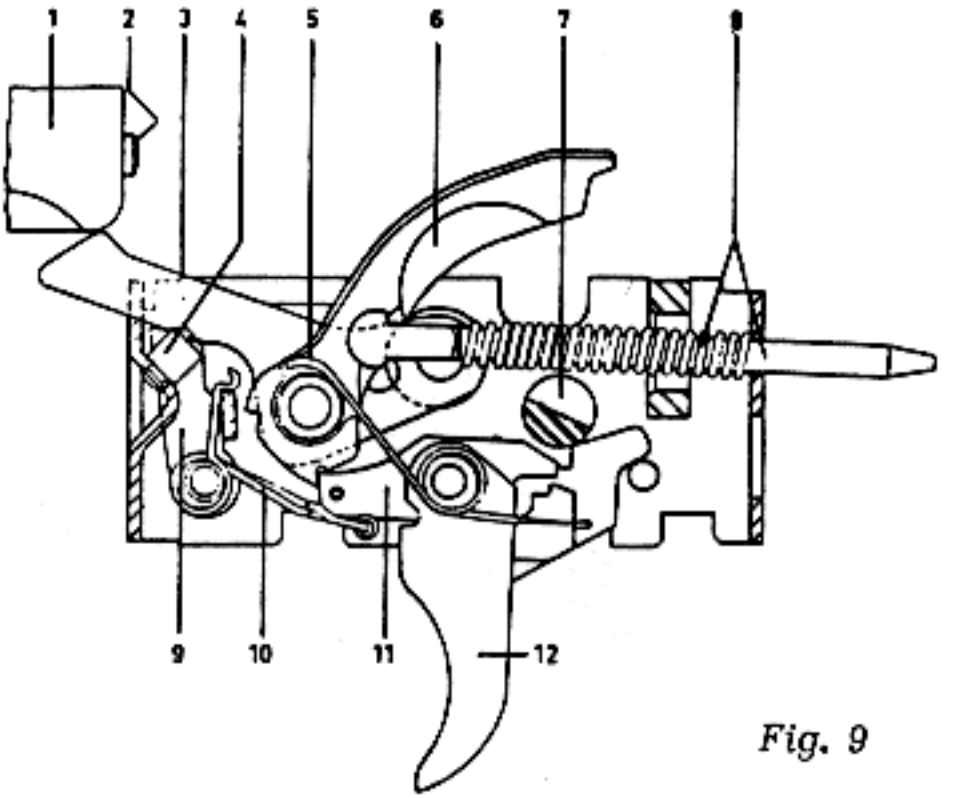


Fig. 9

SELECTOR LEVER AT "S" SAFE

The weapon is loaded and the hammer is in the cocked position, being held by the sear nose. The selector lever is in the "S" safe position. In this position the trigger is blocked by the shank of the selector lever and cannot be rotated rearward.

The selector lever is positioned at "S' for semi-automatic fire.

1. *Camming surface of bolt carrier*
2. *Hammer notch for full-auto fire*
3. *Hammer notch for semi-auto fire*
4. *Notch for sear*
5. *Recessed step for semi-auto fire*

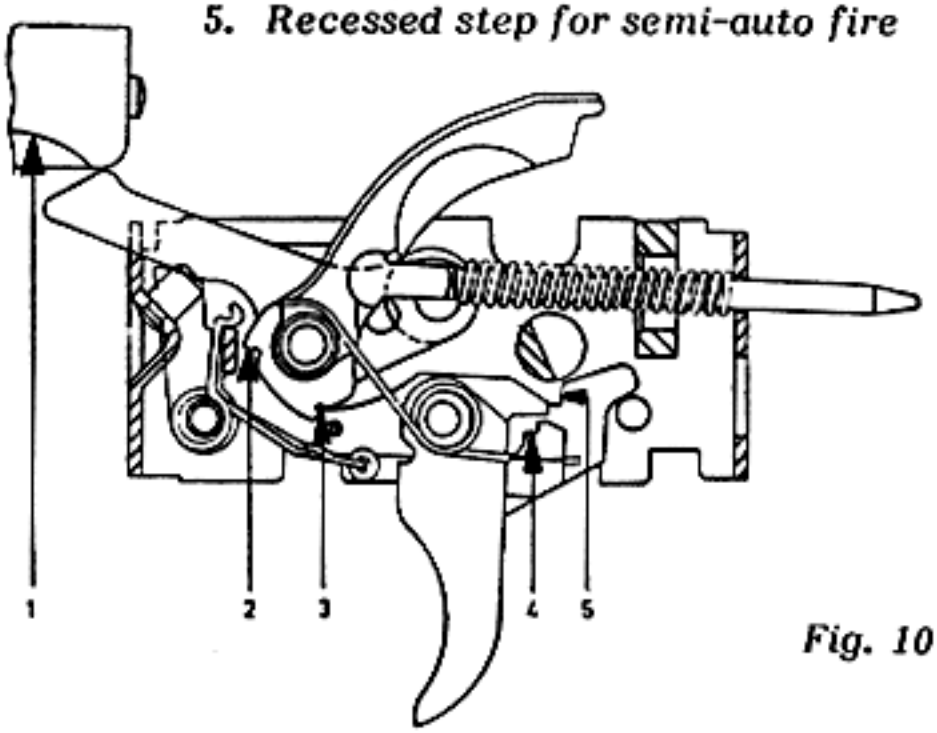
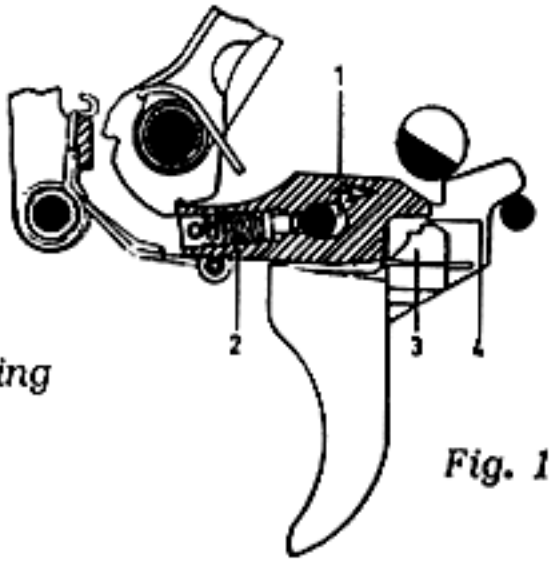


Fig. 10

POSITION OF TRIGGER PARTS AT "F" SEMI WITH HAMMER COCKED

The sear pivots on a slotted hole which can be shifted about 1.5 mm in its longitudinal travel.



1. *Slotted hole*
2. *Compression pin with spring*
3. *Trigger sliding block*
4. *Center of pressure on trigger block*

Fig. 11

In the cocked position, the sear is under forward pressure against the lower notch in the hammer by means of the pressure pin and spring contained in the sear. During cycling of the bolt at the position in which the hammer pivots forward, the semi-auto notch engaging the nose of the sear, the sear assembly is pushed backwards overcoming the forward tension exerted by the compression pin and spring. This short longitudinal movement of the sear places the rear of the sear above the upper step of the trigger block. The complete forward movement of the bolt and carrier assembly depresses the release lever which in turn forces the catch (secondary sear) forward out of an intersecting position with the hammer. At this point the hammer is retained only by the sear.

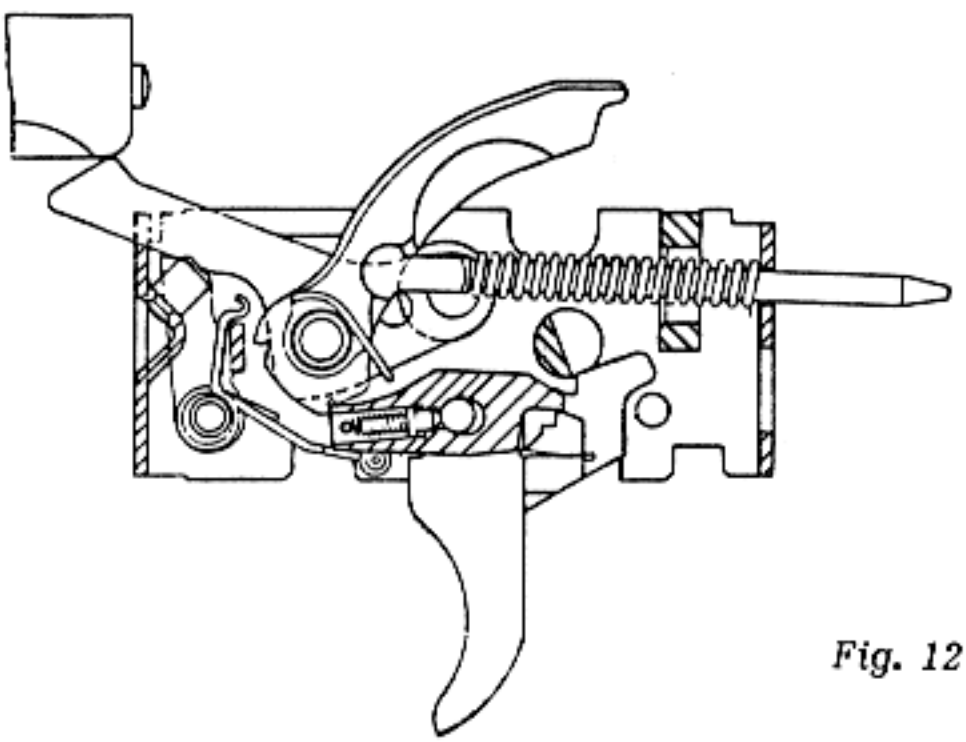


Fig. 12

SELECTOR AT "F" SEMI-AUTO

When the trigger is depressed the extending lever with its machined groove rotate upward against the selector lever shaft which is in the "F" position. At the same time the sear nose is pivoting downward out of engagement with the hammer, thereby releasing it to rotate forward under pressure from the pressure spring.

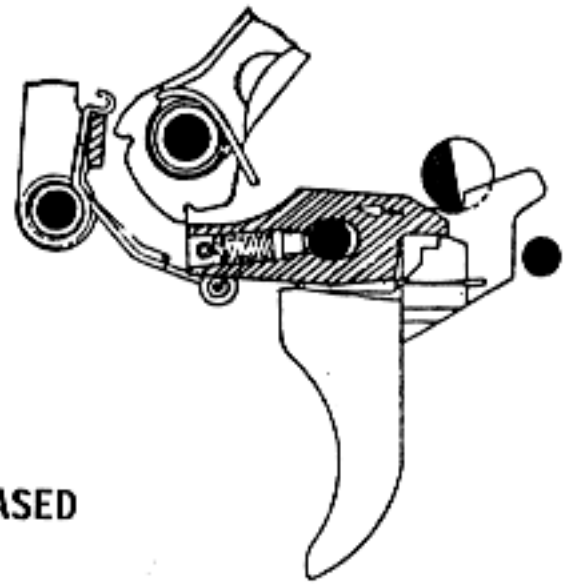
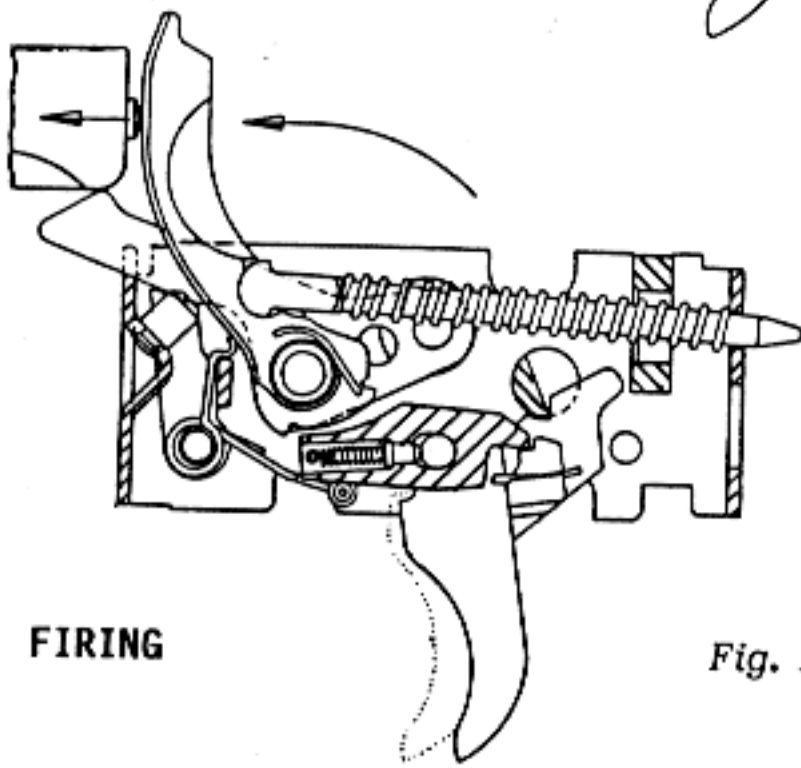


Fig. 13

HAMMER BEING RELEASED

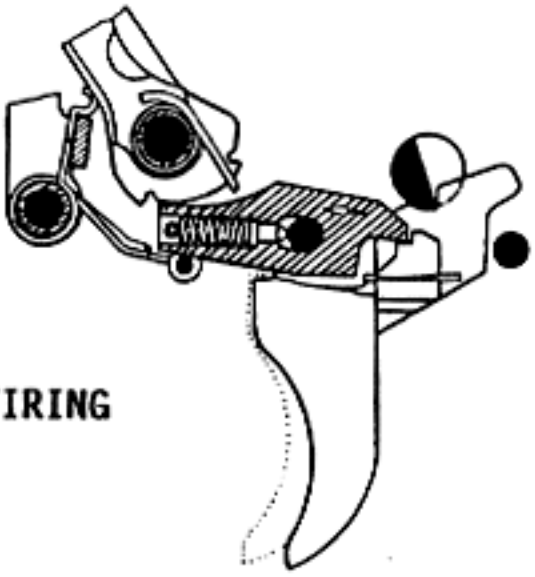


FIRING

Fig. 14

The hammer having been released from engagement with the sear rotates forward hitting the firing pin and detonating the cartridge.

As the hammer rotated forward the rearward pressure against the sear was released, allowing the pressure pin and spring in the sear to push the sear assembly forward.



AFTER FIRING *Fig. 15*

With the trigger still rearward the forward pressure against the sear causes the rear of the sear to slide off of the top of the trigger block into a recessed notch. At the same time upward pressure is exerted on the bottom of the sear nose by the torsion spring and roller contacting the base of the sear.

BOLT MOVEMENT REARWARD, COCKING HAMMER

As the bullet exits the barrel, the bolt carrier assembly reciprocates pushing the hammer backwards.

As the hammer continues rearward rotation the semi notch will engage the nose of the sear momentarily which is under pressure from the torsion spring. As the hammer continues movment rearward the burst notch in the hammer slides over the engaging surface of the secondary sear which is also under tension from the torsion spring.

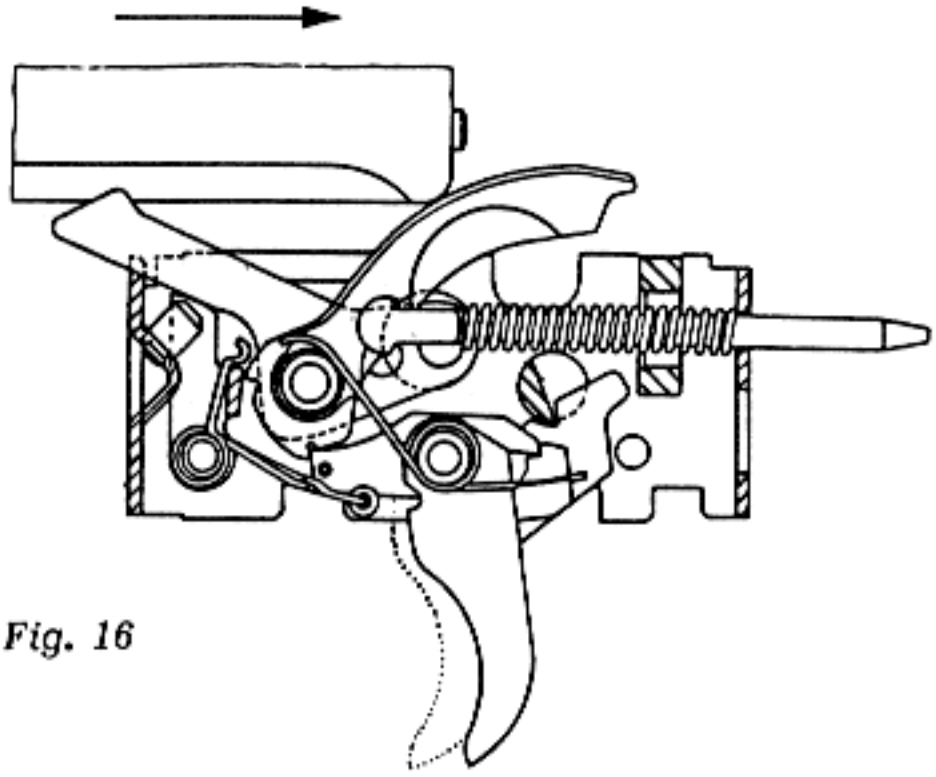


Fig. 16

BOLT RECIPROCATING REARWARD

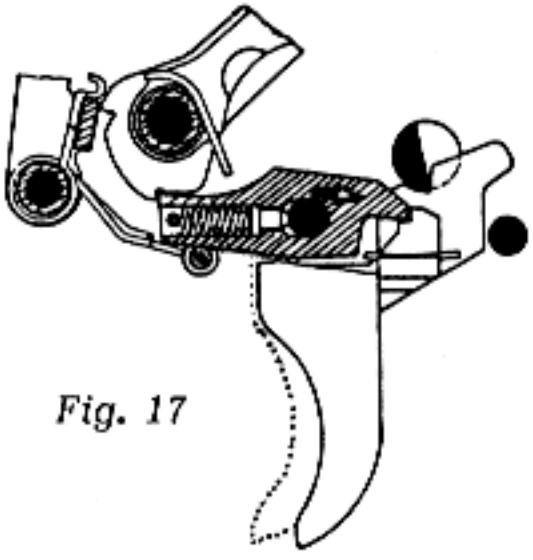


Fig. 17

HAMMER ENGAGING SEMI-AUTO NOTCH

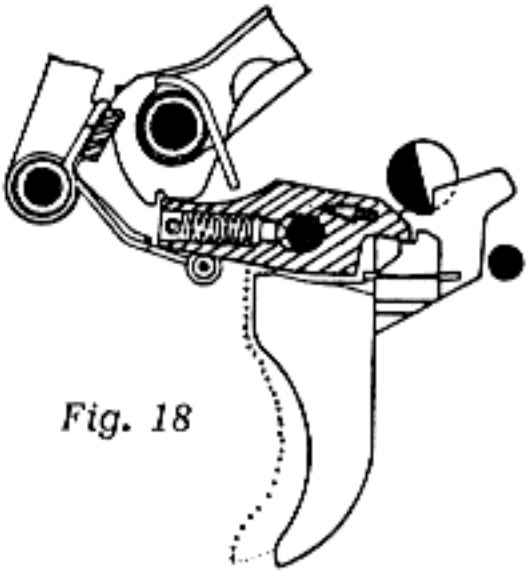


Fig. 18

SECONDARY SEAR ENGAGING "BURST" NOTCH IN HAMMER

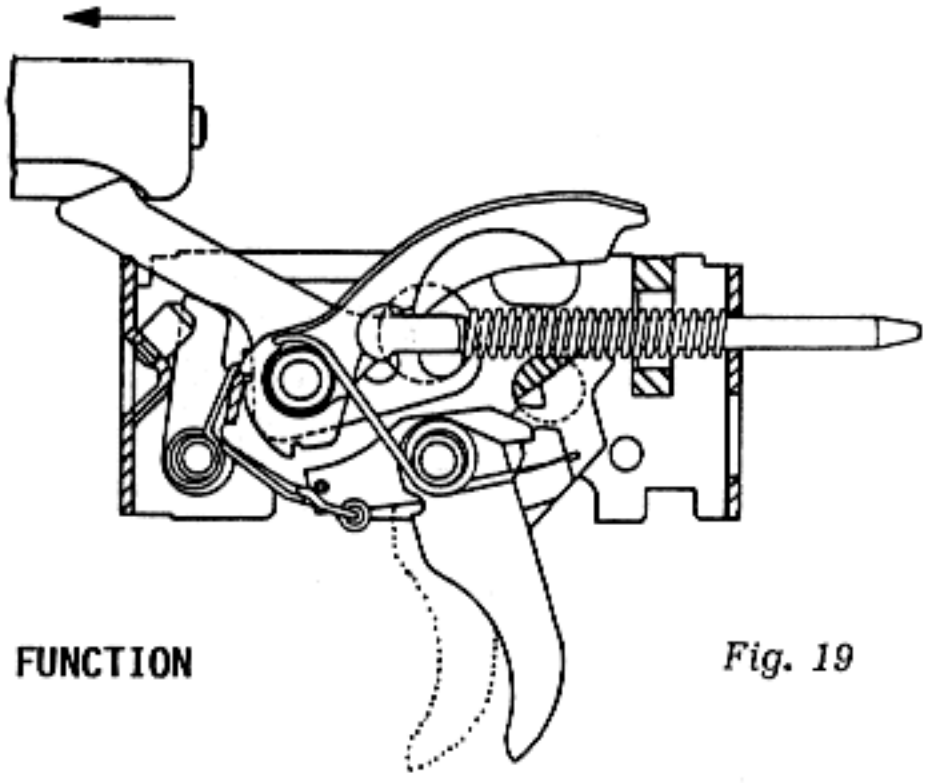
The recoiling bolt carrier assembly strikes the buffer and under the influence of the recoil spring reverses causing forward movement of the bolt carrier assembly. The camming surface in the bolt carrier forces the release lever forward in turn pulling the secondary sear out of engagement with the burst notch in the hammer. At this point the hammer cannot be released until the firer releases the trigger which allows the rear of the sear to rise above the top of the trigger block at which time the pressure pin and spring in the sear move the sear rearward over the trigger block. The sear can then be pivoted out of engagement with the hammer by depressing the trigger again.

The process of single shots will continue as long as the firer manually initiates them.

FULL AUTOMATIC FIRING

For full automatic firing the selector lever is turned to "A" which positions the slot in the selector lever shank in such a manner as to allow maximum travel of the trigger and extended trigger arm against the selector shaft.

The extended travel of the trigger in this selector position forces the sear nose to be positioned in such a low location as to prevent the interception of the hammer by the sear nose. The hammer is held only by the secondary sear in the burst notch.



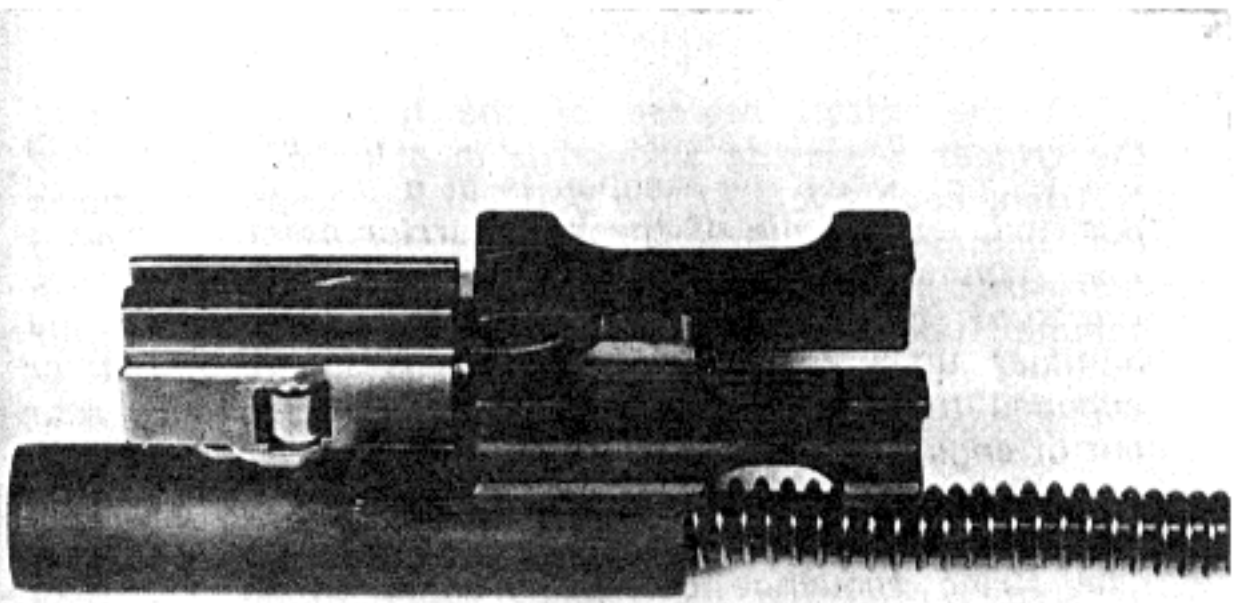
BURST FUNCTION

Fig. 19

After the initial release of the hammer by pulling the trigger when the weapon is in a locked and loaded position, each cycle of the bolt carrier assembly causes the hammer to engage the secondary sear during rearward movement and subsequently releasing the hammer upon forward movement as the bolt carrier engages the release lever tripping the secondary sear out of engagement with the hammer.

The firing sequence can be interrupted by the firer by simply releasing the trigger which allows the sear nose to intercept and hold the hammer in a cocked position.

A right view of the modified Trigger and Grip Assembly, showing the relative position of the Release Lever and Tripping Block at a point where both are in contact. *Fig. 20*



Bolt and Carrier Assembly in inverted position, showing Tripping Block in the installed position. *Fig. 21*

4

Modification To Weapon

The selective fire conversion of the HK-94 semi-automatic carbine requires the following modifications to existing parts of the weapon:

HAMMER

A second sear engagement notch, similar to the primary sear notch, must be machined into the front of the hammer. The purpose of this is to engage the secondary sear which holds the hammer in a rearward position during each forward cyclic action of the bolt. Since the hardness of the hammer is around 58 on the Rockwell "C" scale, the notch must be ground rather than milled. (This can be done by any well equipped machine shop.)

It is important that this operation be done as accurately as possible, and grinding the notch by hand on a bench grinder will not be accurate enough. To properly orient the hammer when setting up to grind the secondary sear notch, a 42° angle template was made which is shown in figure 24. The angle opposite the 42° is a right angle, 90°, and it is upon this side that the template and hammer are positioned in the vise. A simple plunge grind with a dressed

90° wheel will provide the correct profile notch in the hammer. Note the location of the step in relation to the pivot hole in drawing # 23.

BOLT CARRIER

The bolt carrier used in the HK-94 was originally machined to be an MP5 carrier. The MP5 carrier provided a camming surface in the right hand clearance slot milled in the bottom rear area and is used to contact and trip the top of the release lever during the final forward movement of the carrier and bolt assembly. This in turn disengages the secondary sear from the hammer and as long as the trigger is pulled, effects full automatic firing. This action occurs each time the weapon cycles, regardless of whether it is in the full or semi-automatic mode.

In the HK-94, this camming surface has been removed by milling the clearance slot all the way to the rear of the bolt carrier, thereby removing the capability to trip a sear release lever. In doing this conversion, it was necessary to make a tripping block which was heli-arc welded in the slot. The profile of the block provides a radiused camming surface identical to the original MP5. An alternate method of attaching the tripping block to the bolt carrier is to bond the block onto the bolt carrier using a high strength epoxy cement such as "J-B WELD", which is an automotive epoxy used to repair engine blocks. This product is available at many automotive supply companies.

TRIGGER HOUSING

The trigger housing is another part which was originally made for the MP5, but later modified for the HK-94. The trigger travel limit pin must be removed to allow further trigger travel, necessary when the selector is in the full automatic position. In this position the sear nose, which engages the hammer sear notch (primary), can be pivoted into a lower positon where it cannot intercept the hammer until the trigger is released.

Also, the double-arm torsion spring roller, which pushes the sear upward, has a different pivot spindle hole location, closer to the hammer than that found on the MP5. This is because the lower front housing was altered to provide clearance for the block in the matching area of the grip which mounts into the receiver. A clearance slot must be milled into the small bottom plate of the trigger housing. This allows clearance for the release lever assembly when it pivots forward.

To remove the trigger travel limit pin for this conversion, either mill the protruding part of the pin down flush with the inside surface of the trigger housing, or use a hand grinder such as a DREMEL "MOTO-TOOL" to remove the pin.

GRIP

The "grip" is the external housing into which the trigger housing is assembled. The 94 grip features two settings for positioning

the selector. The upper detent is labeled "S" or "0", and represents SAFE. The lower detent is identified as "F" or "1", and represents FIRE (semi). Since a third detent is required to position the selector for full-auto firing, the selector lever stop lug which acts to stop rotation of the selector downward, must be pressed down flush with the surface of the grip and a third detent be machined or pressed into the grip to position the selector in the "A" or "2" setting, representing FULL AUTO.

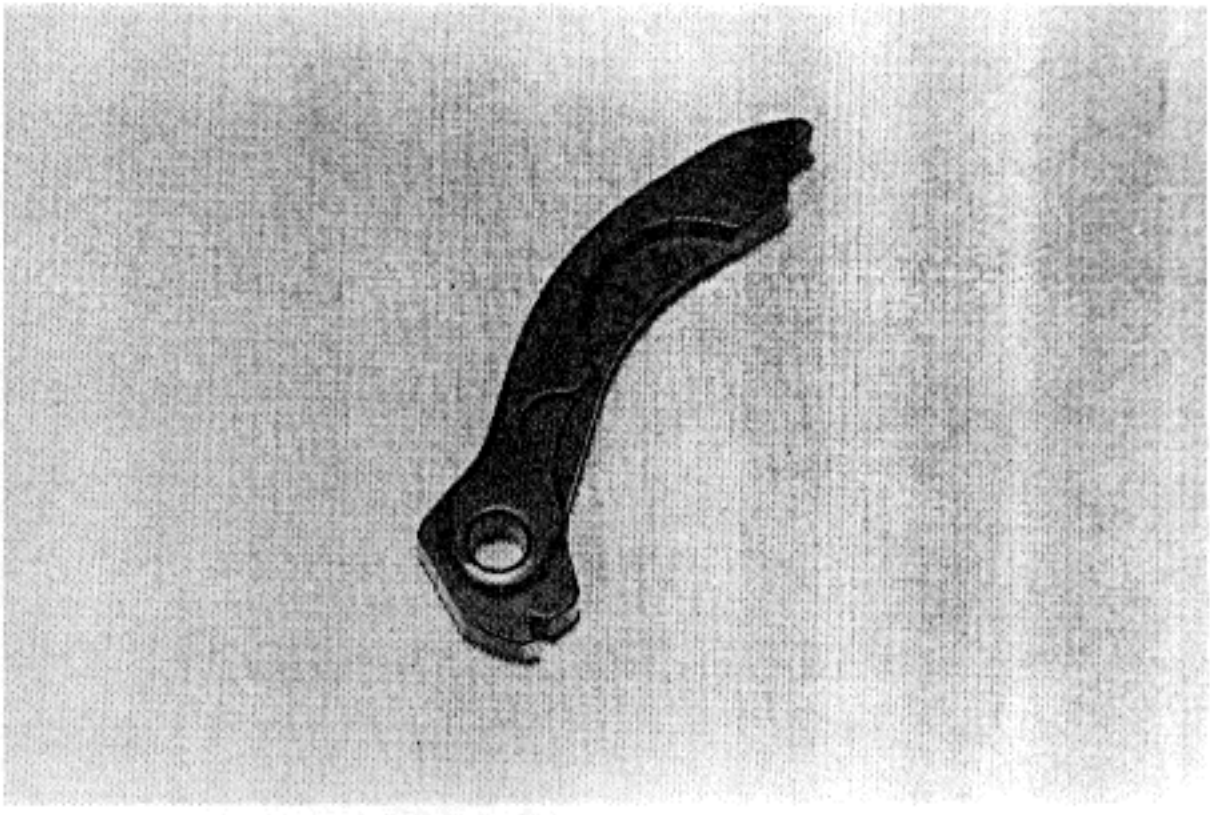
To press the selector lever stop lug down flush with the grip:

1. Insert a tightly fitting block in the grip frame under the stop lug.

2. Place a narrow shim made from feeler gage or shim stock thick enough to fill the space between the block and the bottom of the raised part of the grip which has the detent pressed into it. The purpose of this thin shim is to support the raised part of the grip when the lug is pressed.

3. Press the stop lug down until it is flush with the top of the raised area of the grip. Finish touching up the remaining surface irregularities here by smooth filing and filling any remaining depression with a filler material. Touch-up paint with a semi-gloss black paint.

4. Locate the position of the third detent and indent the grip by either pressing or machining with a .125 diameter ball nosed end mill. The latter method is the one most commonly used and easiest to perform.



Commercial H&K **94** *hammer. Modify hammer to specifications below.*

Fig. 22

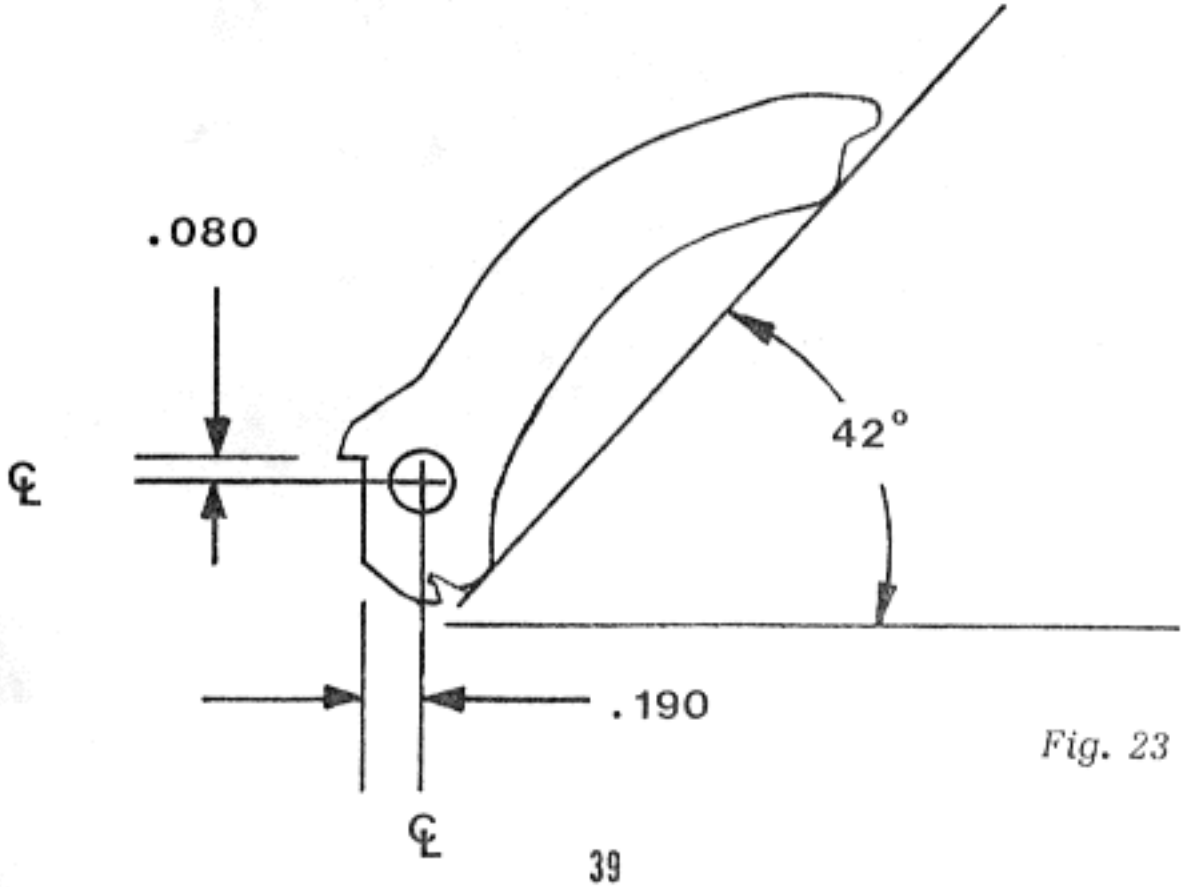
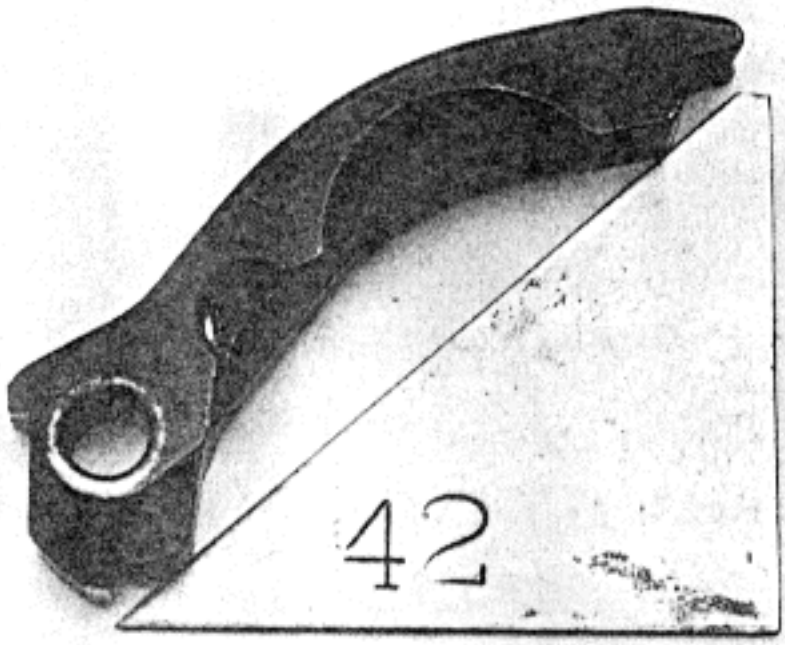
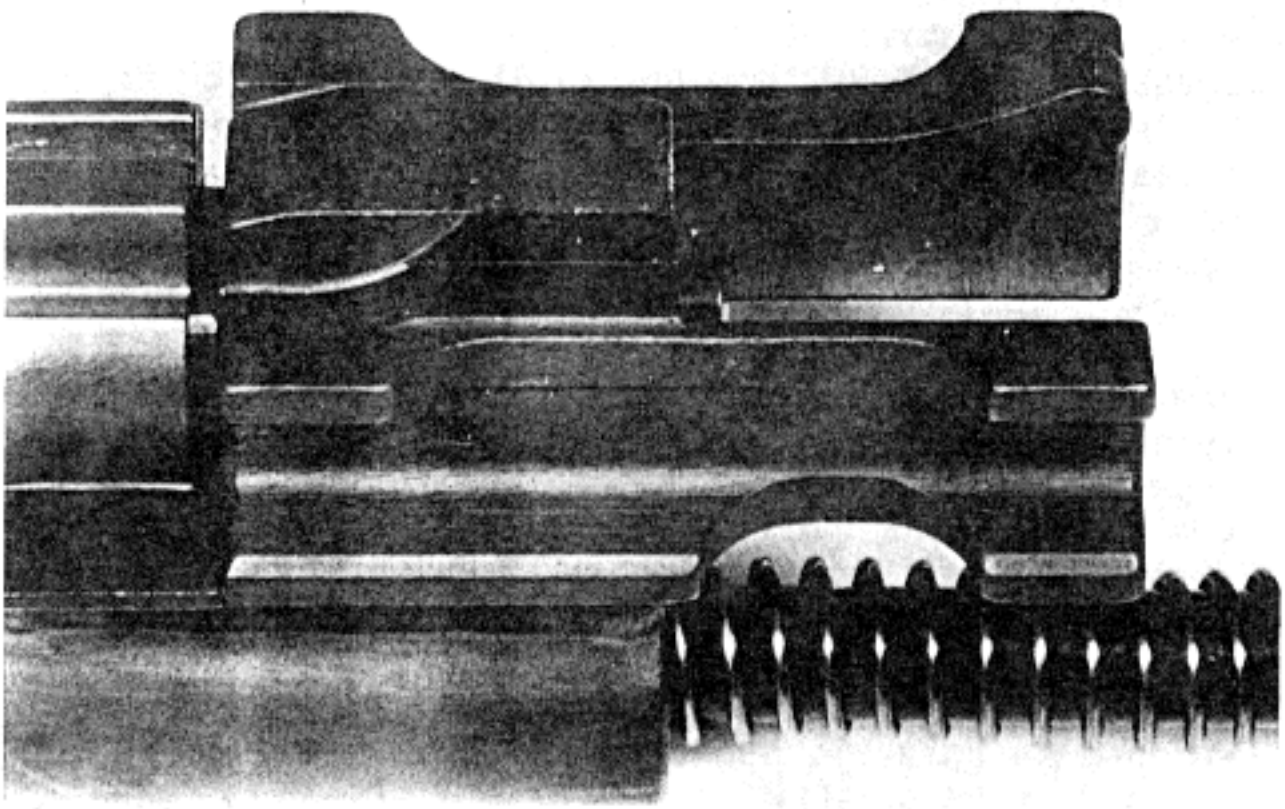


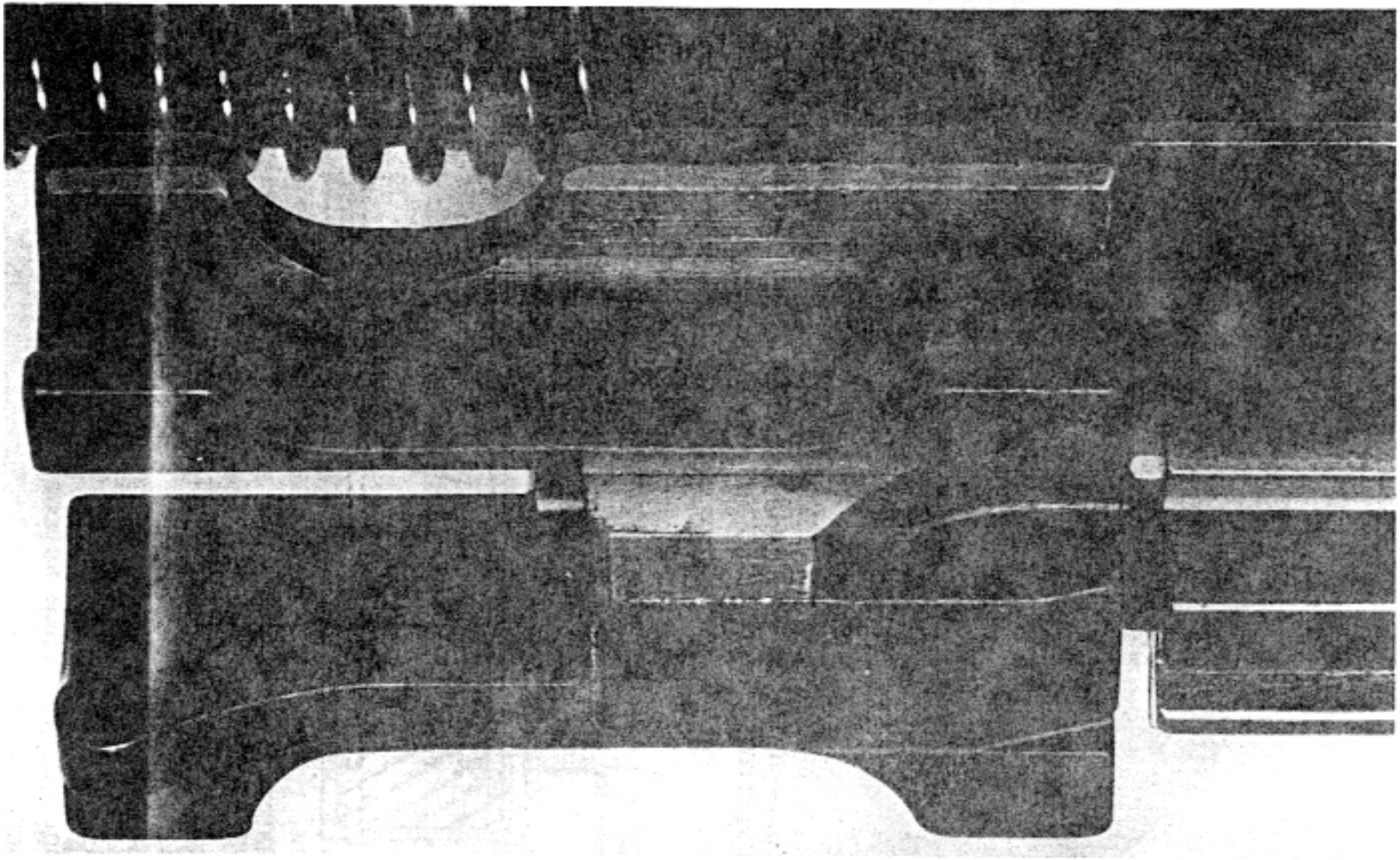
Fig. 23



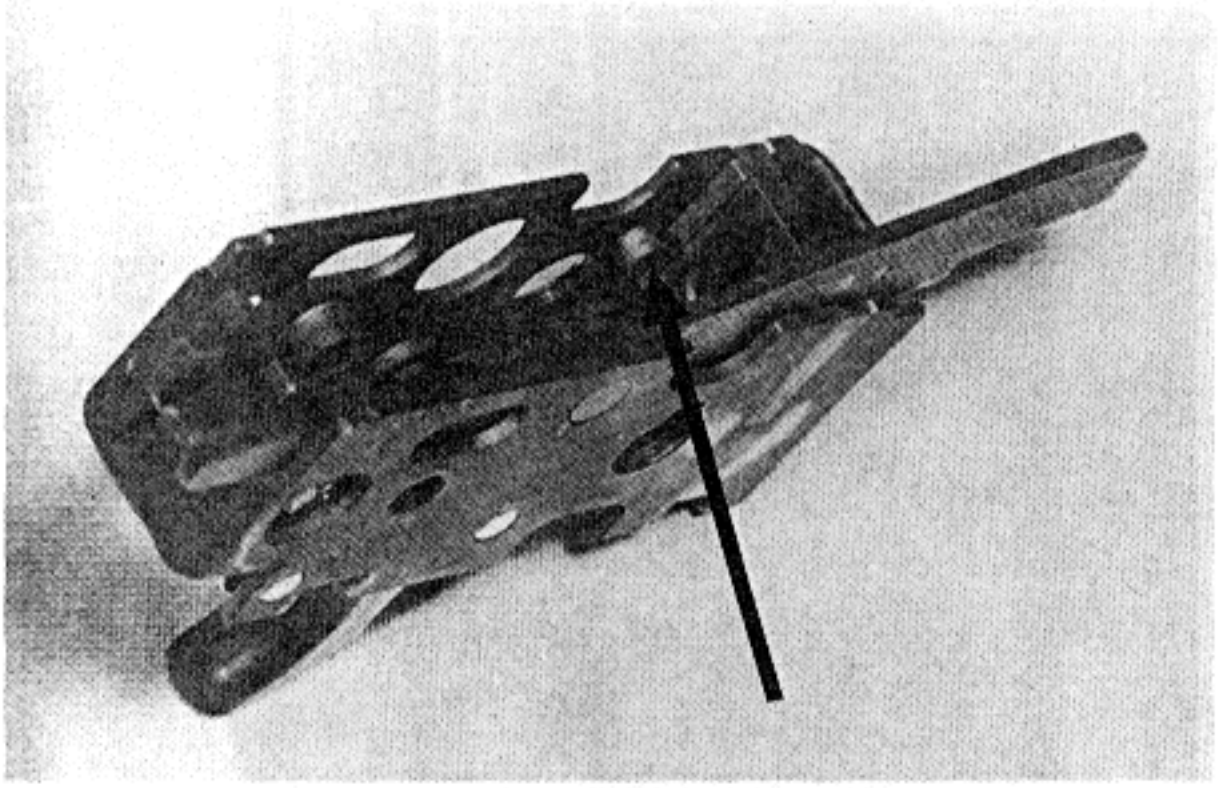
A modified Hammer is shown along with a 42° template made to aid in the layout of the Secondary Sear notch. Note position of the notch ground into front of Hammer. Fig. 24



The factory issued HK-94 Bolt Carrier has had the camming surface machined out preventing use of factory full auto parts. The Tripping Block is attached at this point. *Fig. 25*



Close-up detail of the completed modification to Bolt Carrier showing Tripping Block in position. *Fig. 26*



Remove trigger travel limit pin or grind off flush with inner surface of the trigger housing. *Fig. 27*

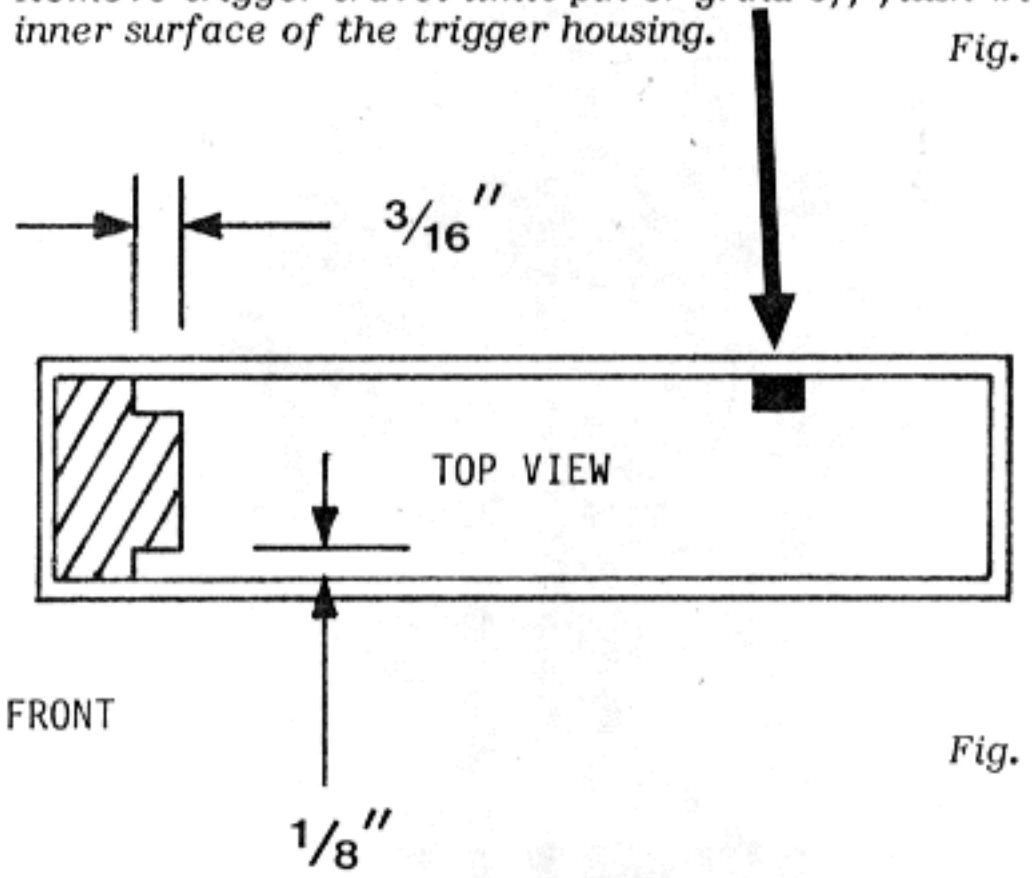


Fig. 28

Spring clearance notches 3/16" long X 1/8" wide, two places.

5

Parts To Be Manufactured

The parts to be manufactured to complete selective fire conversion of the HK-94 consist of the TRIPPING BLOCK and the SECONDARY SEAR/RELEASE LEVER ASSEMBLY.

TRIPPING BLOCK - BOLT CARRIER

As previously described in the chapter MODIFICATIONS TO WEAPON under "BOLT CARRIER", the bolt carrier must be modified to provide a contact surface which will engage the release lever.

This is accomplished by constructing and installing a Tripping Block, which simulates the original profile of the contact area on the bottom of the bolt carrier.

The block can be constructed of almost any type of steel, with heat treatable types being the most desirable because of their wear resistant characteristics. A material such as unhardened, ground tool steel (for example-STARRETT O-1 or A-2) can be easily formed, and then hardened after it is in its finished configuration. This will allow continuous use without excessive wear between the contact surfaces.

SECONDARY SEAR/RELEASE LEVER ASSEMBLY

This assembly consists of three individual components: the spindle, a secondary sear, and the release lever which are assembled by heli-arc (TIG) welding. The conversion procedure centers around this assembly which replaces the torsion spring spindle in the trigger housing. The function of this part is to hold the hammer "cocked" during automatic functioning when the primary sear is in the low position where it does not intercept the hammer during the cyclic action of the bolt and carrier assembly. The release lever is the part which, when contacted by the tripping block mounted in the bolt carrier, pivots forward releasing the hammer to rotate forward and strike the firing pin.

Construction of this part has been made simplified as much as possible to eliminate difficulty in building it. This method entails building component parts, and then assembling them by welding. This method is relatively easy when compared to building the entire part from one piece of steel. The following identifies and describes each component part.

SPINDLE

The builder may choose to make a new spindle duplicating the one from the weapon, order a replacement spindle from H&K, or simply use the spindle which was removed from the trigger.

SECONDARY SEAR

The secondary sear is the part which contacts and engages the locking notch in the hammer. This block should be constructed of a heat treatable steel, equivalent to the material used for construction of the tripping block in the bolt carrier modification. Machine this part as shown in drawing # 32. It will first be assembled to the spindle by welding the two together. Make sure that the two are held parallel when welding. An alternative to heli-arc welding is to silver solder the two parts together.

If the builder has the facilities to do so, the engagement surfaces of the secondary sear, (top and side facing hammer) can be left about .010-.015 oversize and then after assembly to the spindle the engagement surfaces may be precision ground to the dimensions given. This operation will ensure a precision, parallel engagement with the notch in the hammer, although it is not absolutely necessary to ensure proper functioning.

RELEASE LEVER

This is the final component of the SECONDARY SEAR/RELEASE LEVER ASSEMBLY. This part, when assembled with the spindle and secondary sear, functions as a lever which is contacted by the tripping block in the bolt carrier during each cycle of the bolt and carrier assembly. The forward movement of this lever subsequently trips the secondary sear out of engagement with the hammer. This part can be made several ways,

including forming flat steel on a forming brake, forming flat steel stock by heating and hand forging in a heavy vise, or as performed in this conversion, machine the lever from a piece of structural grade angle iron. The size used to build this part was 1" X 1" X .125 thick. This material is easily aquired and shows a surprisingly good wear resistance in this application since the amount of pressure on the contact area of the lever is not that great considering the pivot point of the assembly and angle of disengagement.

NOTE ON HEAT TREATMENT

After welding the component parts of the complete assembly, you may harden the secondary sear to improve its wear resistance. If the material used for construction is an oil or air hardening tool steel such as O-1 (oil hardening) or A-2 (air hardening), heat the secondary sear contact area with a torch until it is cherry red. If O-1 is used, quickly quench the entire part in quenching oil until it has cooled completely. Heavy-medium oil may be used if regular heat treat oil is not available. If the material is A-2, simply allow the part to air cool completely. The grinding operation can be performed at this time if desired.

TESTING

After installing the new and modified parts, test for proper functioning by hand cycling the action. You will be able to look through

the magazine well and observe the release lever contact the camming surface of the bolt. Make sure the bolt and carrier slams home and that the locking rollers engage.

In the safe and semi-automatic modes, the function is the same as before modification. When the select lever is placed in the lowest position, full automatic fire is obtained. The trigger is able to travel further rearward, moving the primary sear fully away from the hammer sear notch. The secondary sear of the release lever assembly now takes over and holds the hammer until the bolt is in battery. This cyclic action continues until the magazine is empty or the trigger is released, allowing the primary sear to take over. If the trigger is depressed again, automatic fire will continue.

This conversion is performed in the same manner as that which is applied to the HK-91/93. All of these weapons function in exactly the same manner, however, the HK-94 release lever and tripping block have a different profile than those used in the 91 and 93.

TRIPPING BLOCK

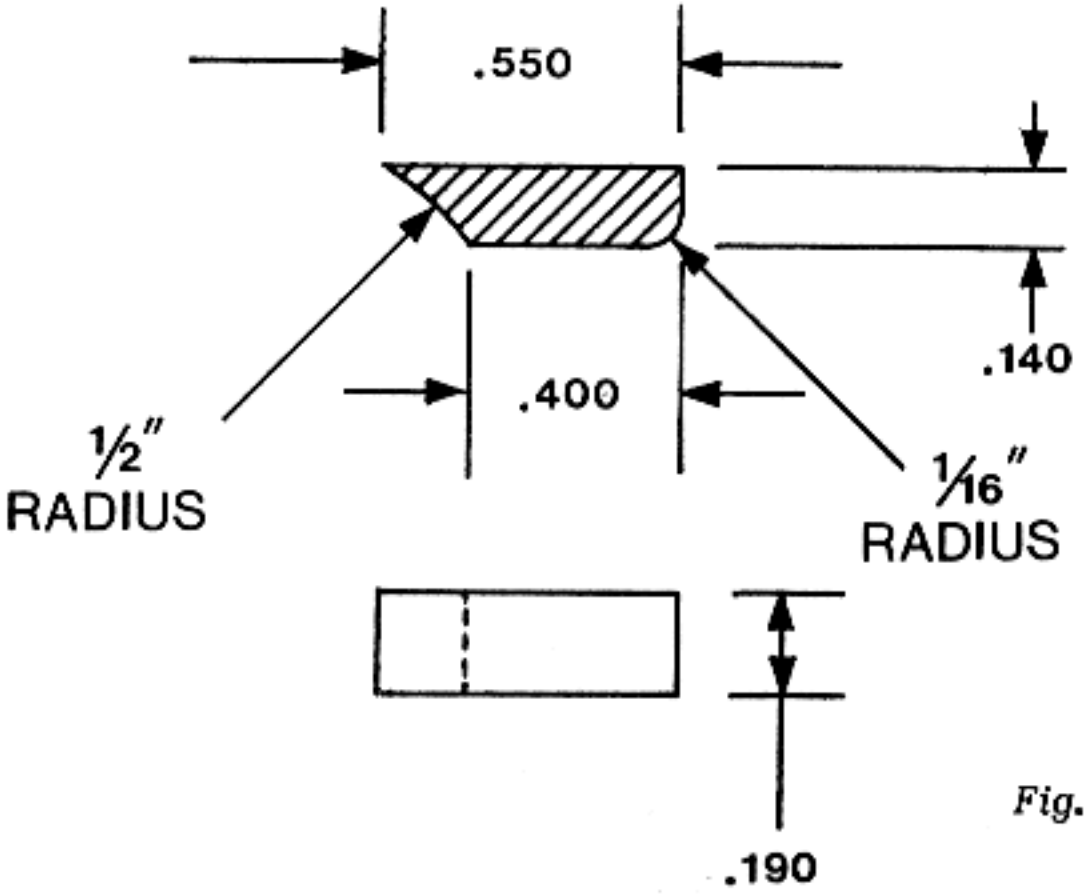


Fig. 29

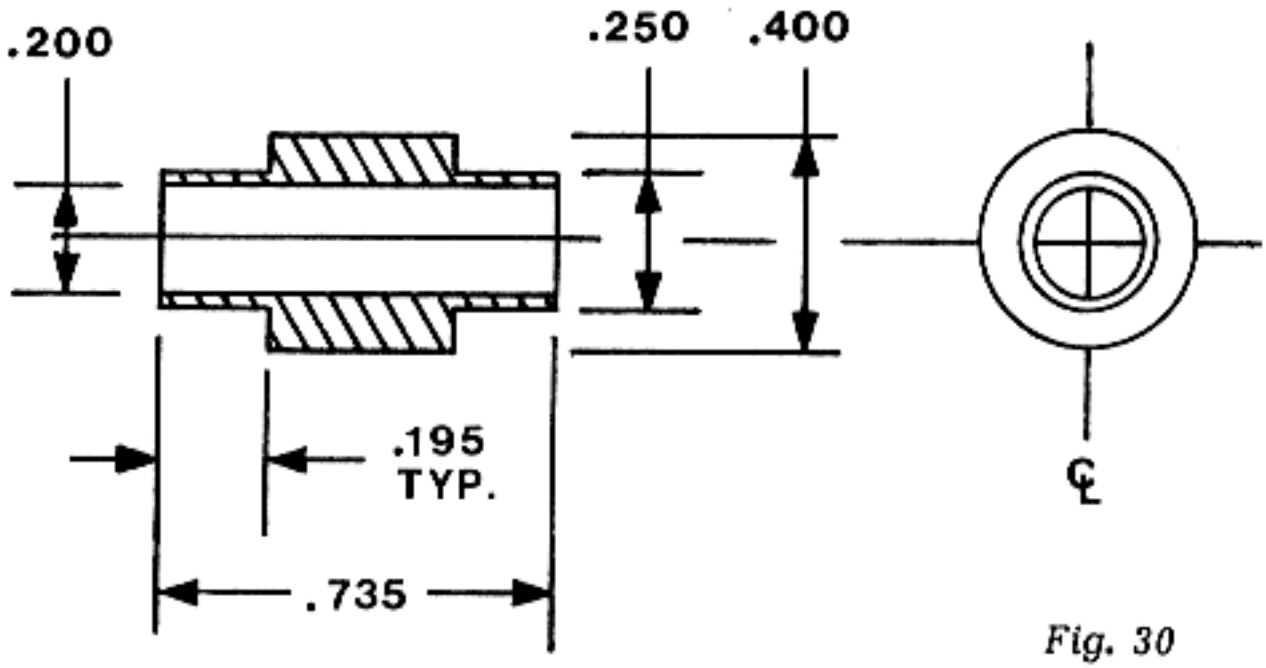
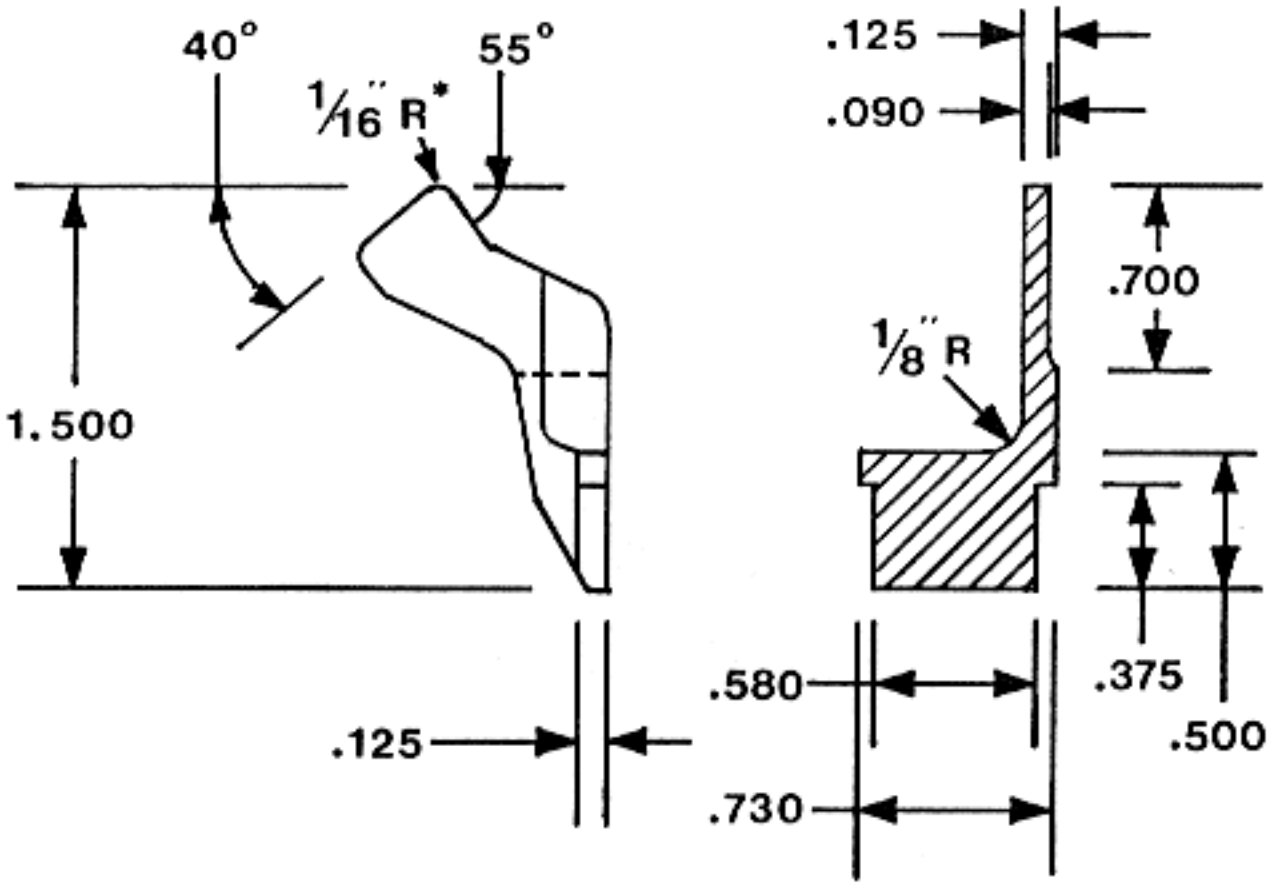


Fig. 30

TORSION SPRING SPINDLE

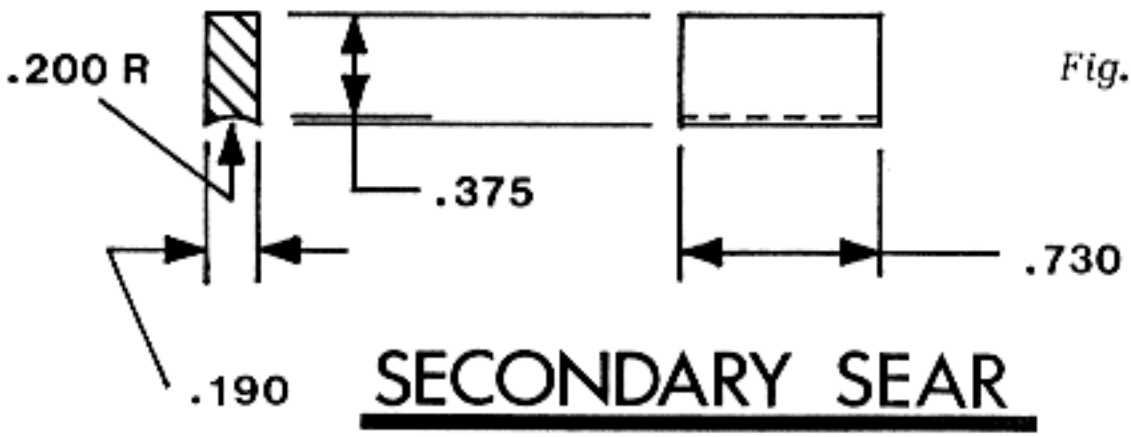


RELEASE LEVER

Fig. 31

USE THIS AS A TEMPLATE FOR LAYING OUT THE RELEASE LEVER. MATERIAL FOR CONSTRUCTION IS STRUCTURAL ANGLE, 1.00" X 1.00" X .125.

* BUILDER MAY CHOOSE TO LEAVE THE CONTACT AREA OF THE LEVER LARGER, ALTERNATELY INSTALLING, TESTING, AND FITTING AS NECESSARY.

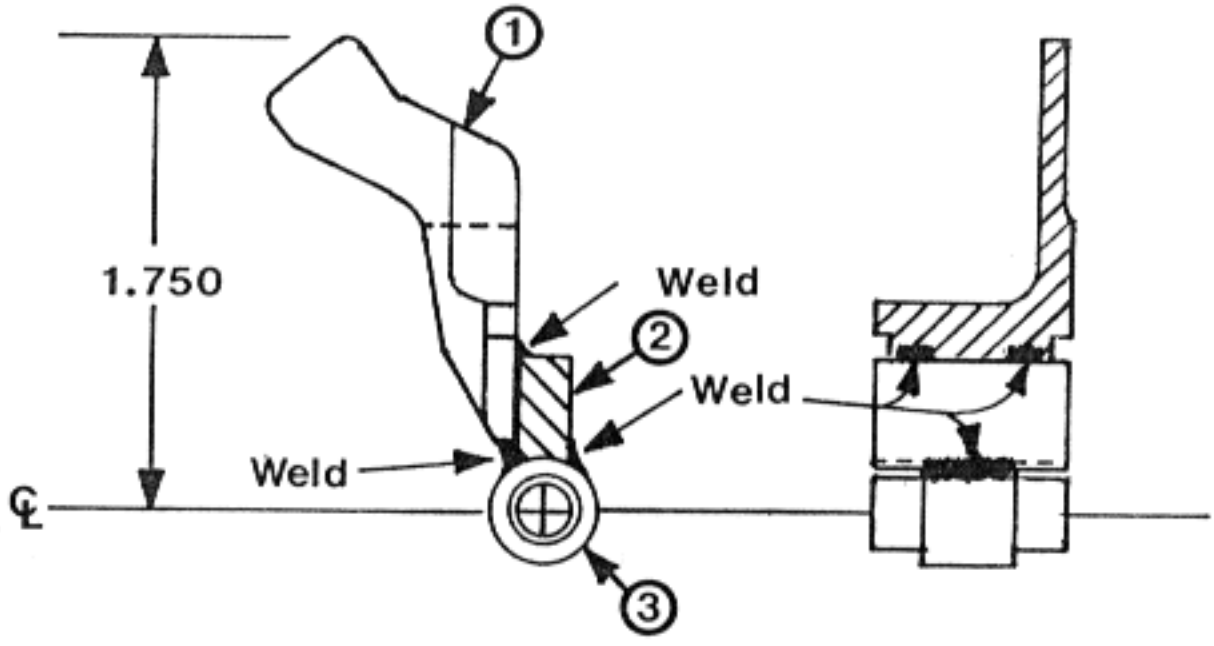


SECONDARY SEAR

Fig. 32

ASSEMBLY DETAIL

Fig. 33



① **RELEASE LEVER**
② **SECONDARY SEAR**
③ **TORSION SPRING SPINDLE**

SEC. SEAR—RELEASE LEVER ASSY.

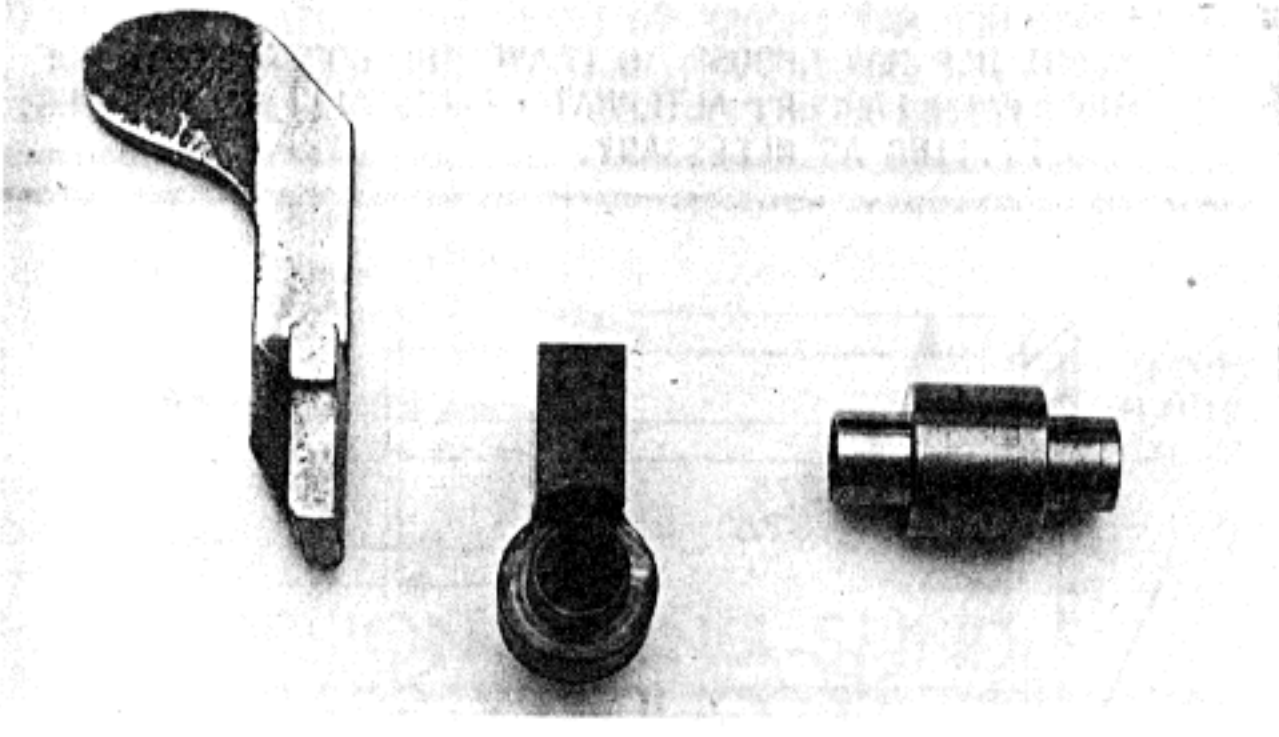
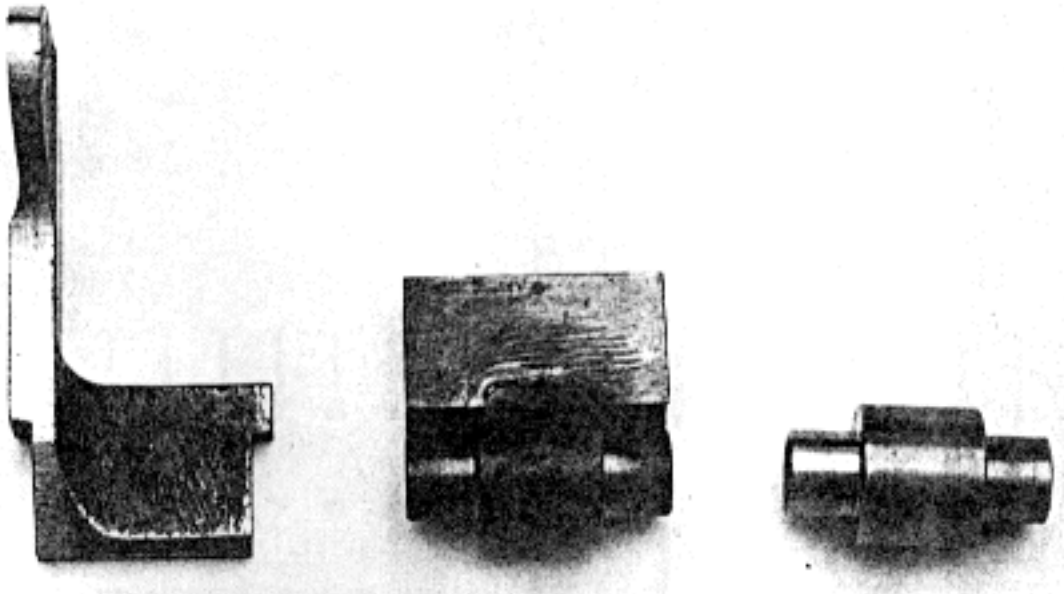
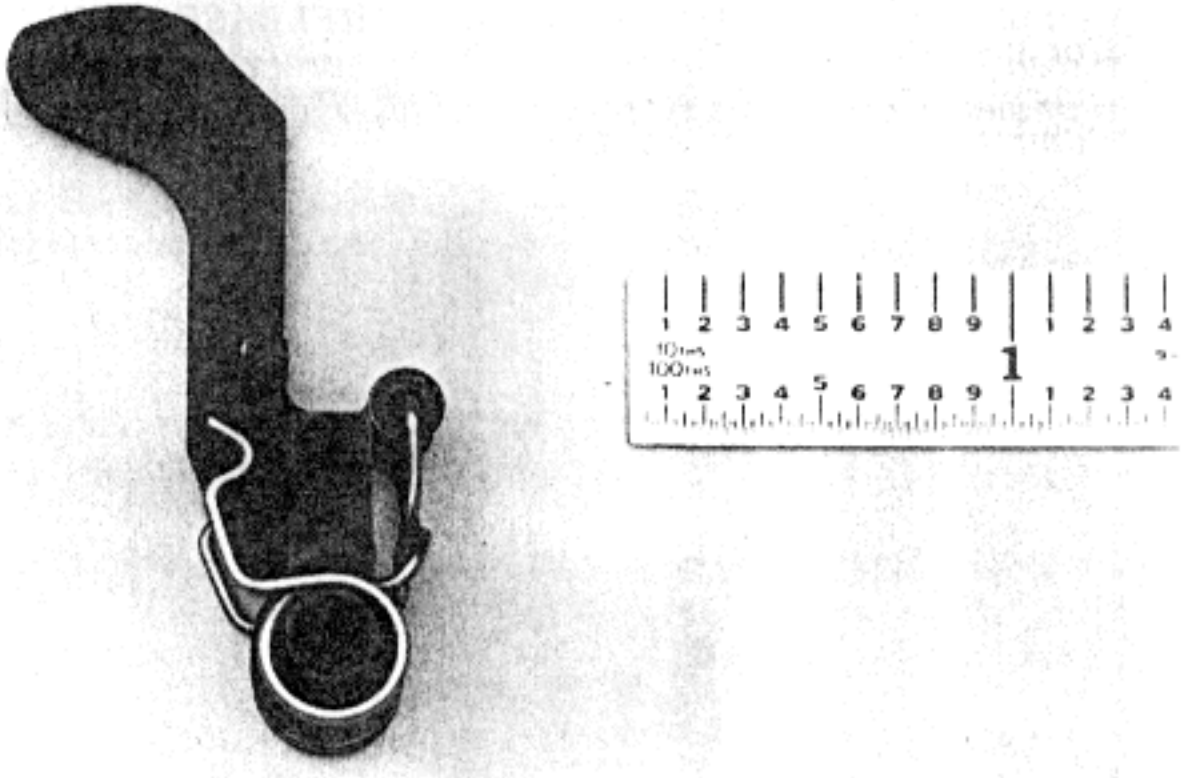


Fig. 34



Release Lever components. Front view of Release Lever (left), Secondary Sear welded to Spindle (middle), and standard HK-94 Spindle (right). *Fig. 35*



Completed Release Lever Assembly with sear torsion spring installed. *Fig. 36*

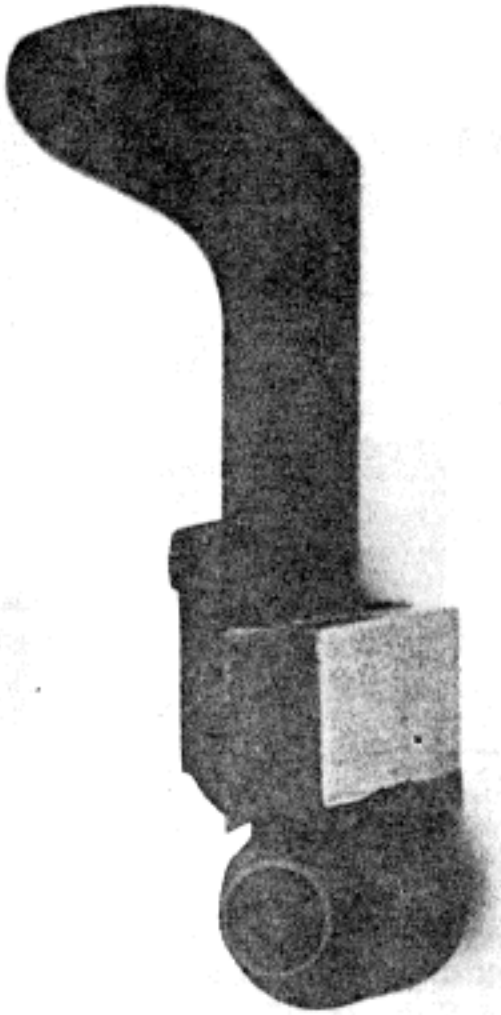
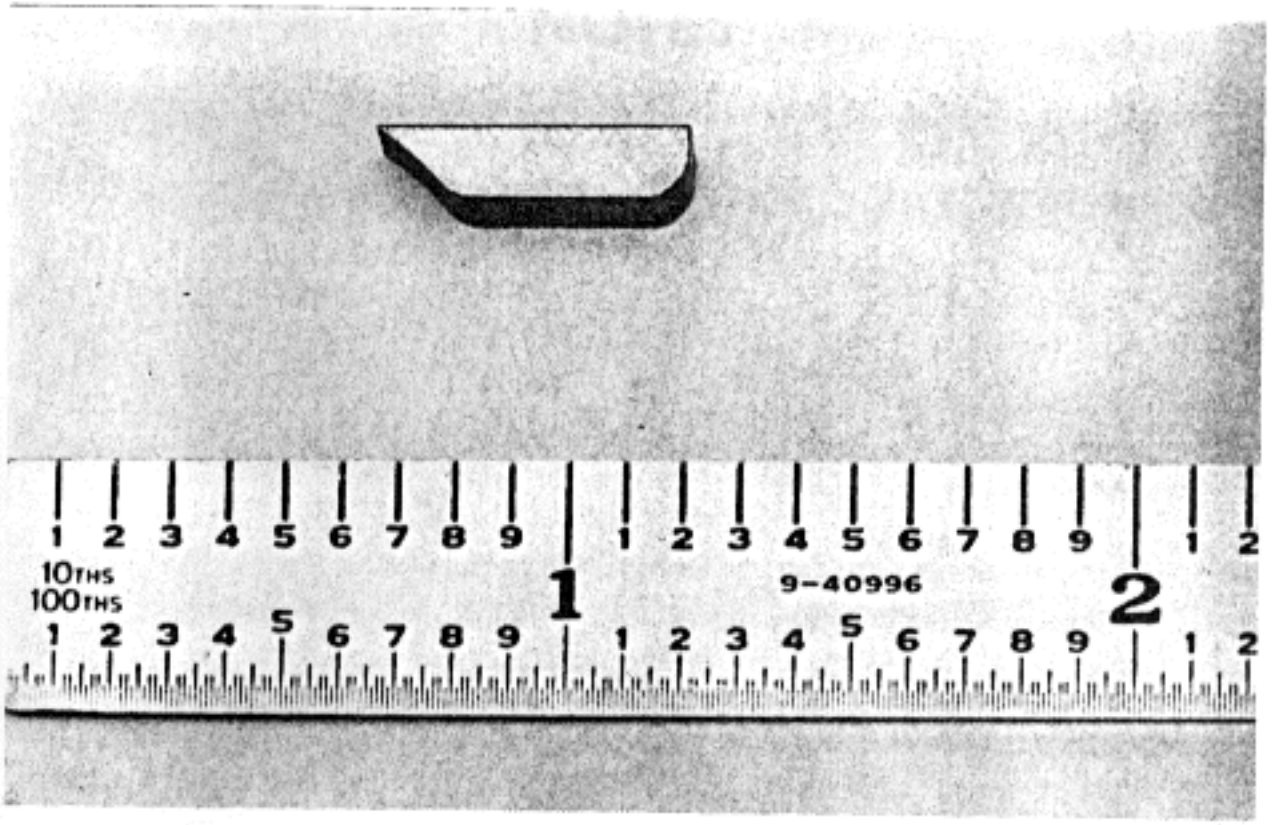


Fig. 37

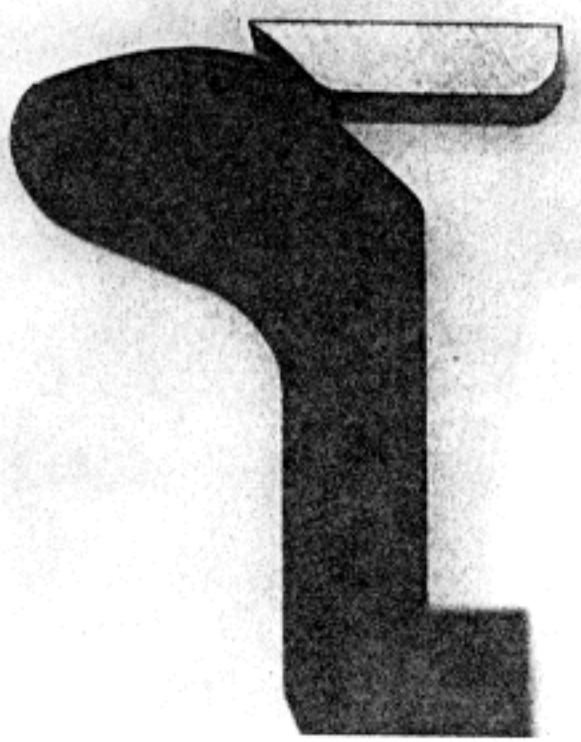
Completed SECONDARY SEAR - RELEASE LEVER shown here after assembly. Note precision ground Hammer engagement surface.

Fig. 38



The Tripping Block is constructed of hardened steel, and when in assembly, contacts and trips the Secondary Sear (Release Lever Assy.) out of engagement with the Hammer.

Fig. 39



Detail of the relative position of the Release Lever Assy. and the Tripping Block (before assembling block).

Fig. 40

Fig. 41